FIGURE 1A

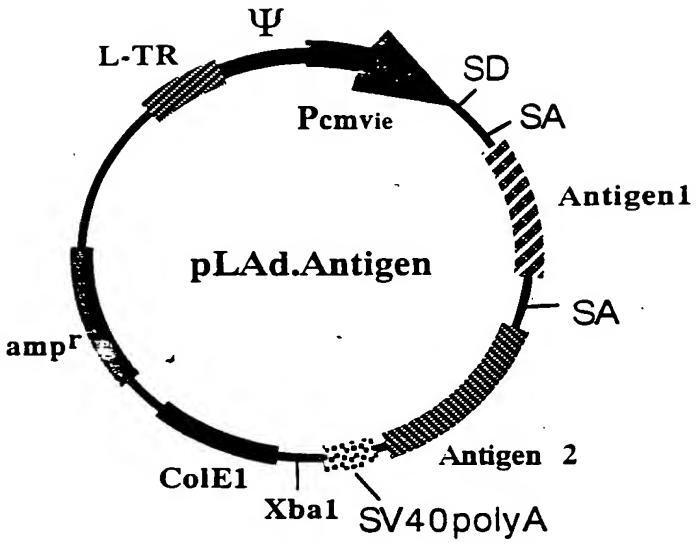


FIGURE 1B

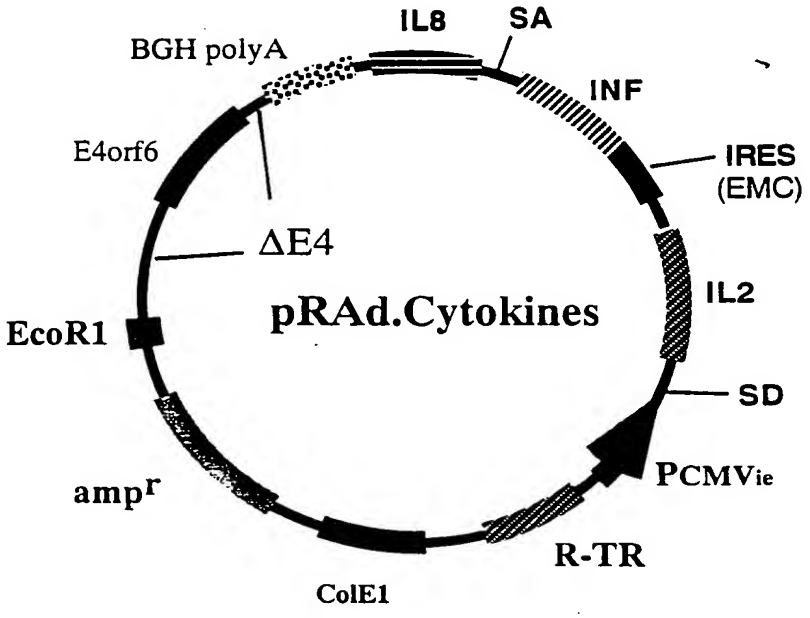


FIGURE 1C

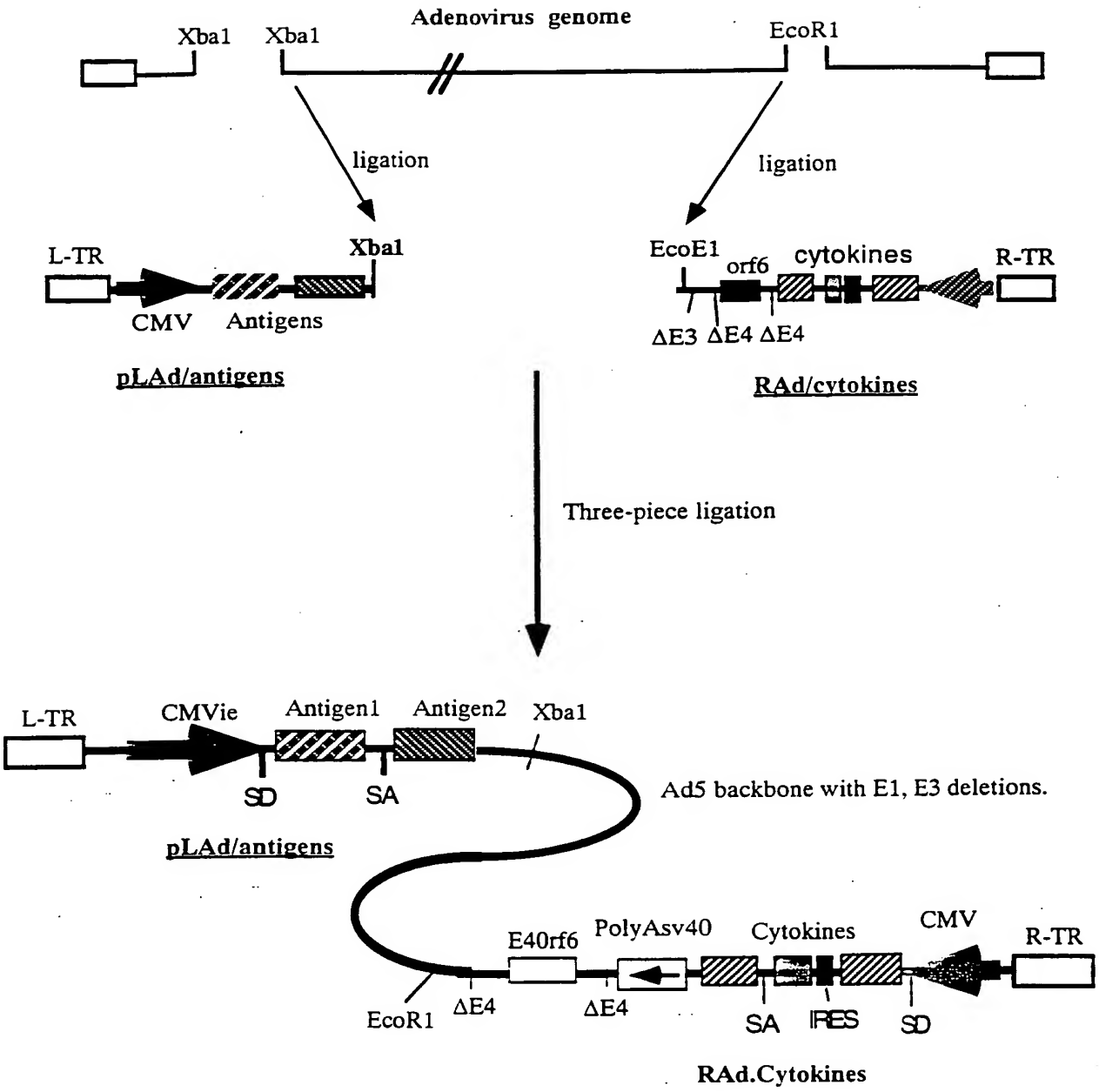
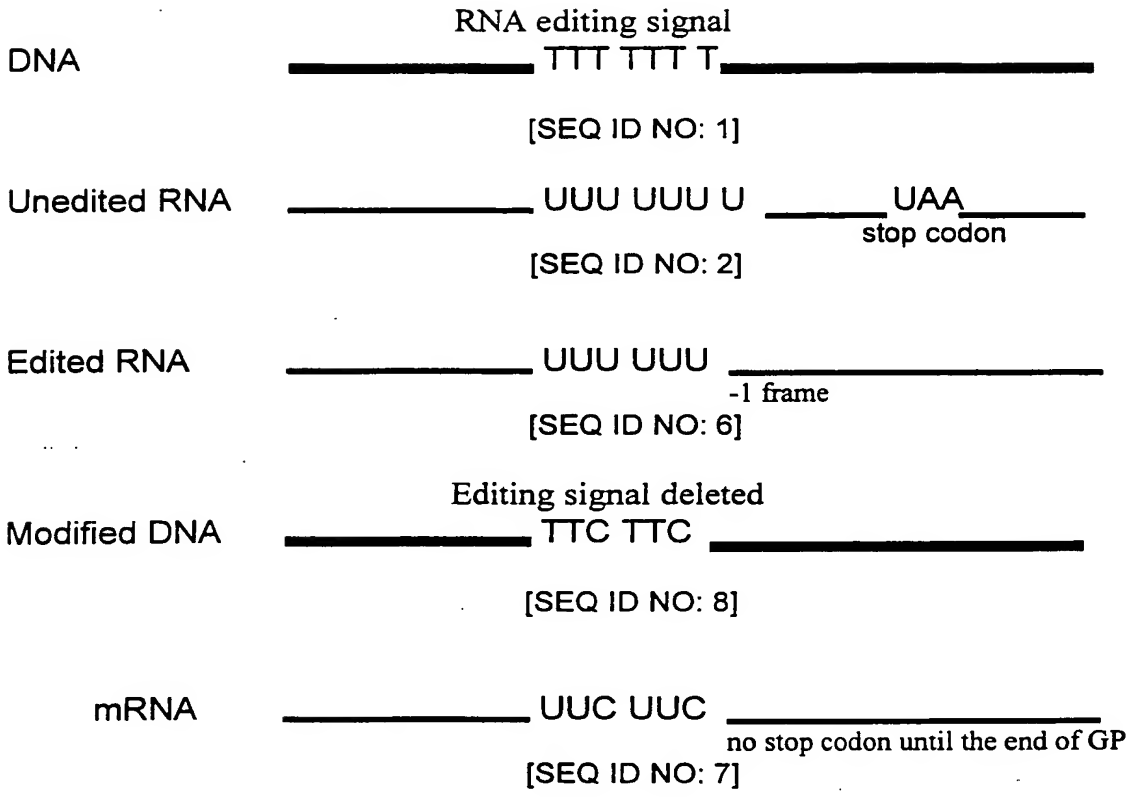

Adenovirus genome
Xba1
Xba1
EcoR1
ligation
ligation
L-TR
Xba1
CMV
Antigens
pLAd/antigens
EcoE1
orf6
cytokines
R-TR
ΔE3 ΔE4 ΔE4
RAd/cytokines
Three-piece ligation
L-TR
CMVie
Antigen1
Antigen2
Xba1
SD
SA
pLAd/antigens
Ad5 backbone with E1, E3 deletions.
E40rf6
PolyAsv40
Cytokines
CMV
R-TR
EcoR1
ΔE4
ΔE4
SA
IRES
SD
RAd.Cytokines

FIGURE 2


RNA editing signal
DNA
TTT TTT T
[SEQ ID NO: 1]
Unedited RNA
UUU UUU U
UAA
stop codon
[SEQ ID NO: 2]
Edited RNA
UUU UUU
-1 frame
[SEQ ID NO: 6]
Editing signal deleted
Modified DNA
TTC TTC
[SEQ ID NO: 8]
mRNA
UUC UUC
no stop codon until the end of GP
[SEQ ID NO: 7]

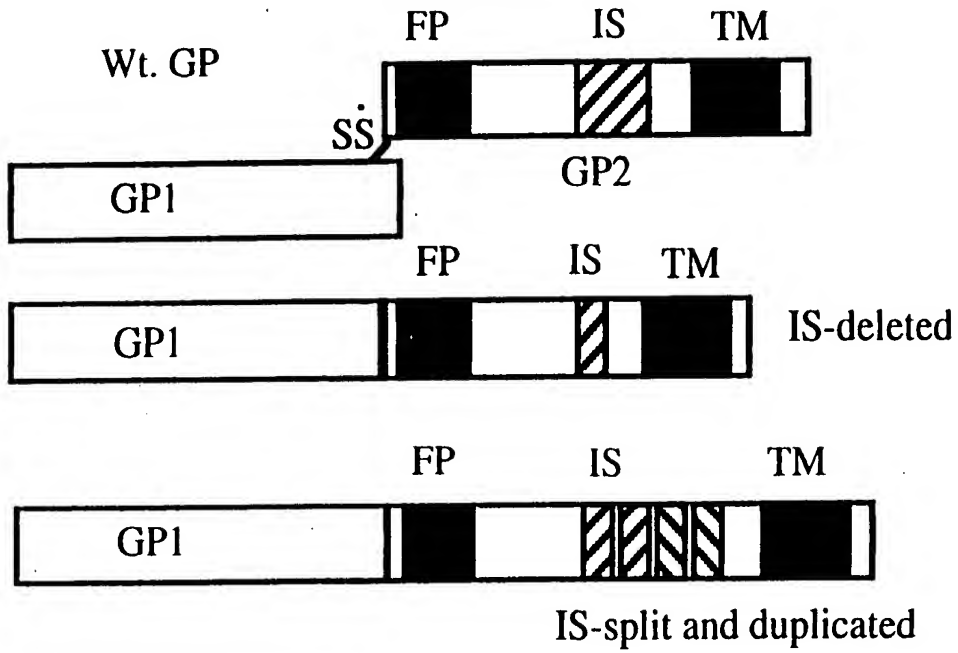


FIGURE 3A

FIGURE 3B

FIGURE 3C

FIGURE 4A

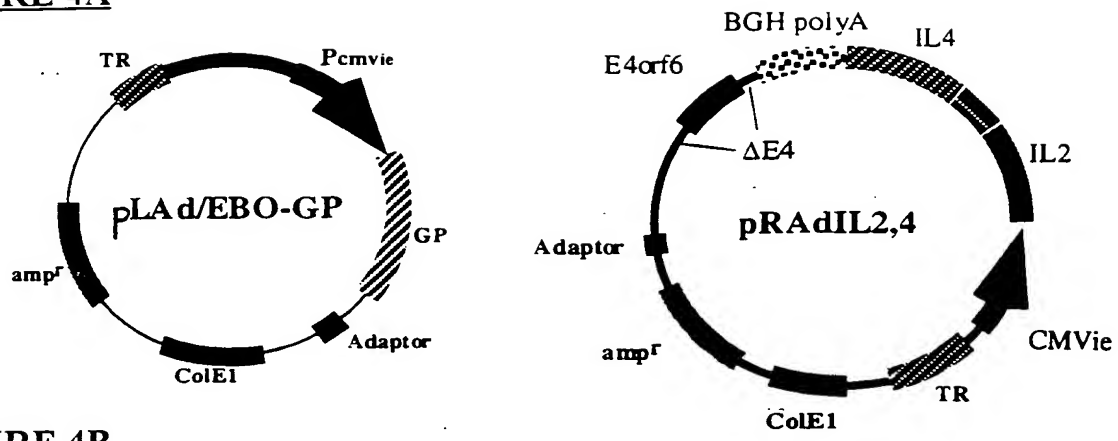


FIGURE 4B

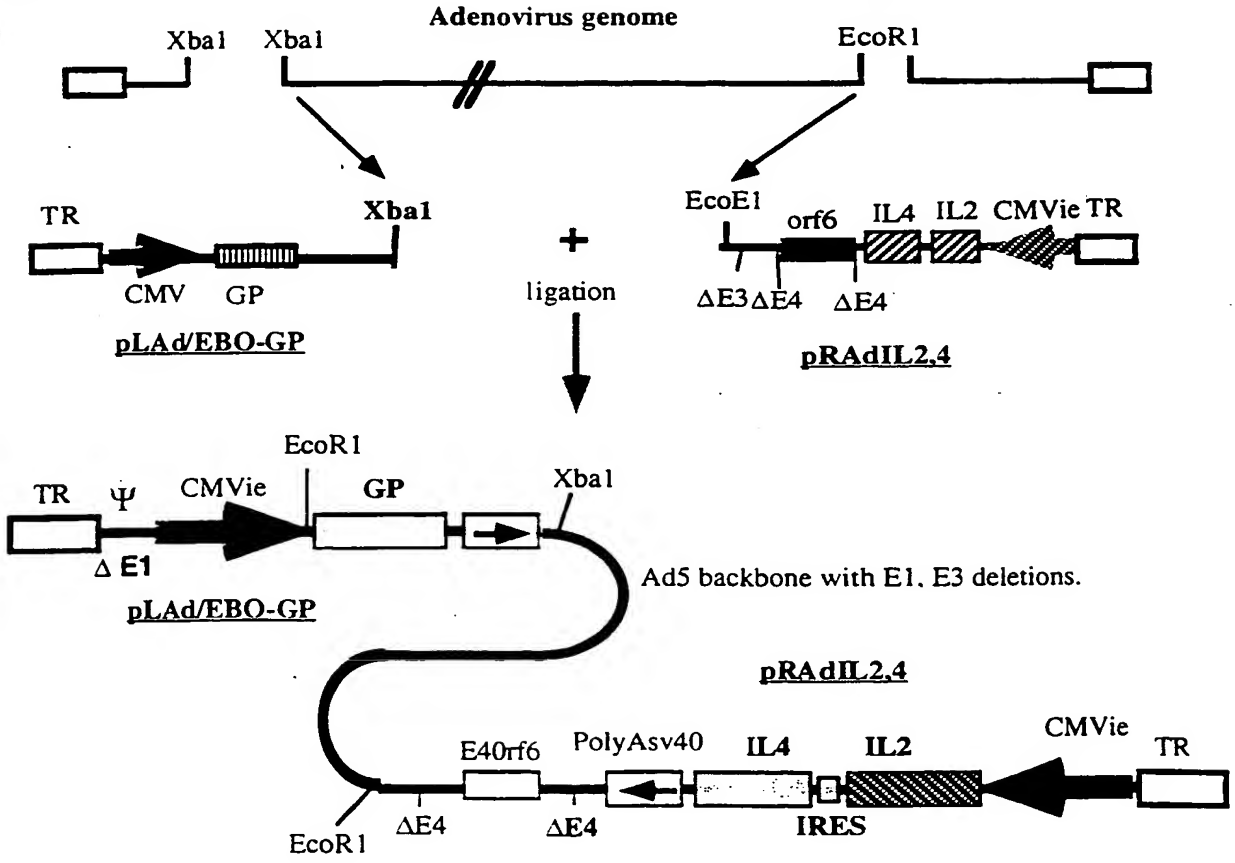
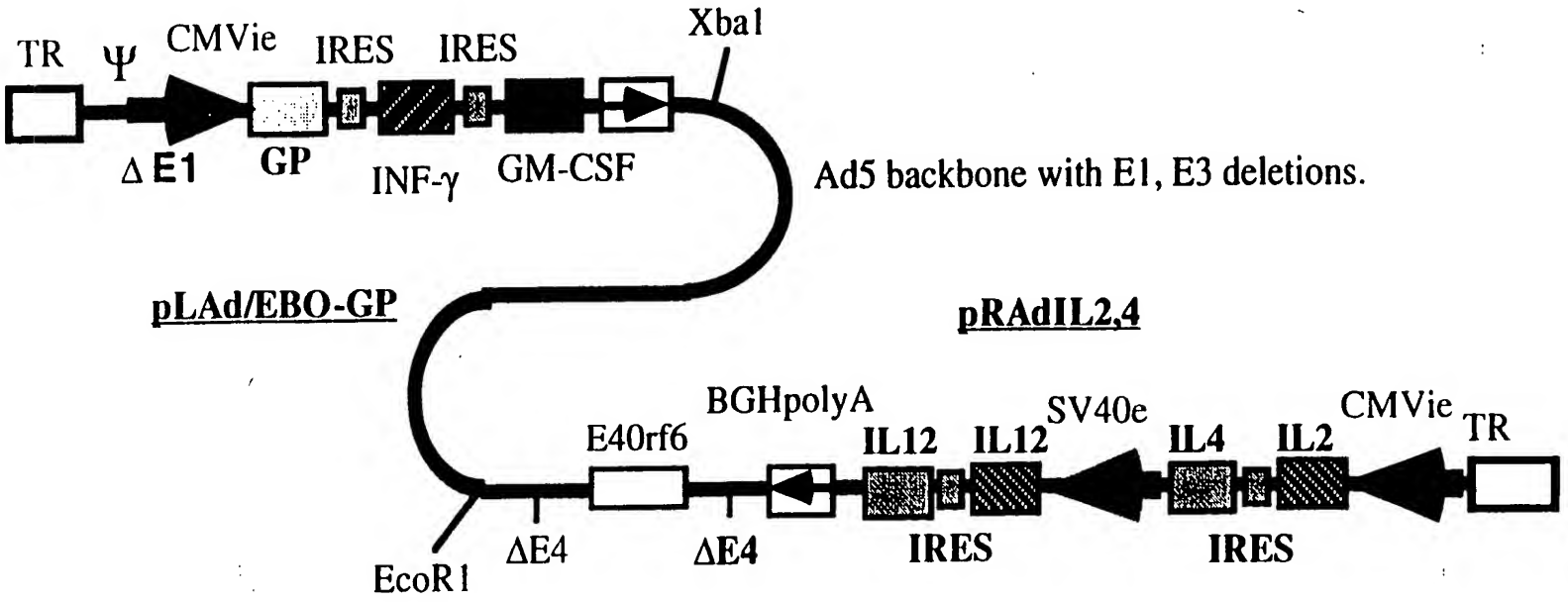


FIGURE 5


TR
Ψ
CMVie
IRES
IRES
Xba1
Δ E1
GP
INF-γ
GM-CSF
Ad5 backbone with E1, E3 deletions.
pLAd/EBO-GP
pRAdIL2,4
BGHpolyA
SV40e
CMVie
TR
E40rf6
IL12
IL12
IL4
IL2
EcoR1
ΔE4
ΔE4
IRES
IRES

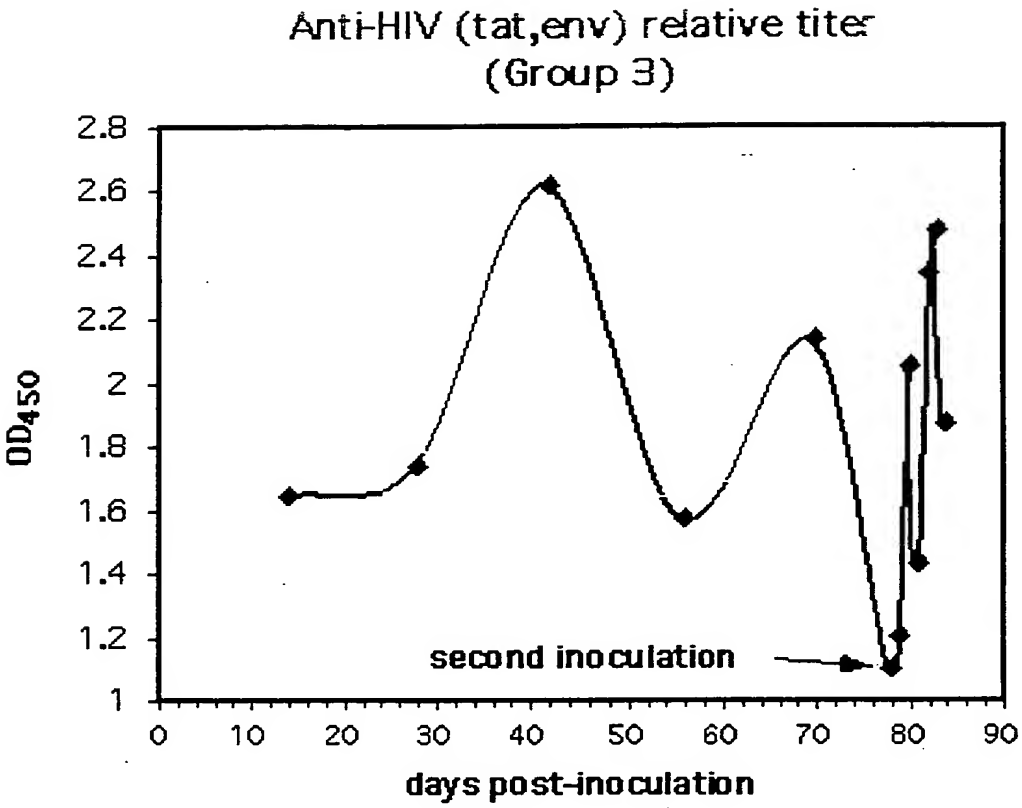

Anti-HIV (tat,env) relative titer
(Group 3)
OD450
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0
10
20
30
40
50
60
70
80
90
second inoculation
days post-inoculation

FIGURE 6

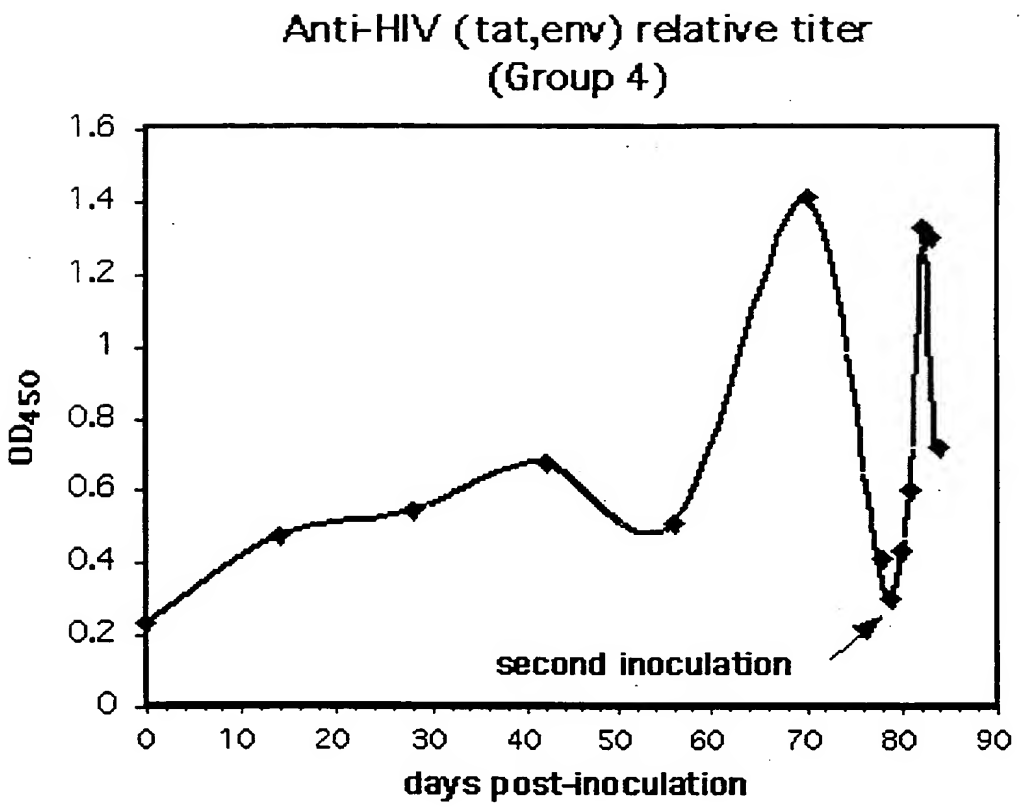

Anti-HIV (tat,env) relative titer
(Group 4)
OD450
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
10
20
30
40
50
60
70
80
90
second inoculation
days post-inoculation

FIGURE 7

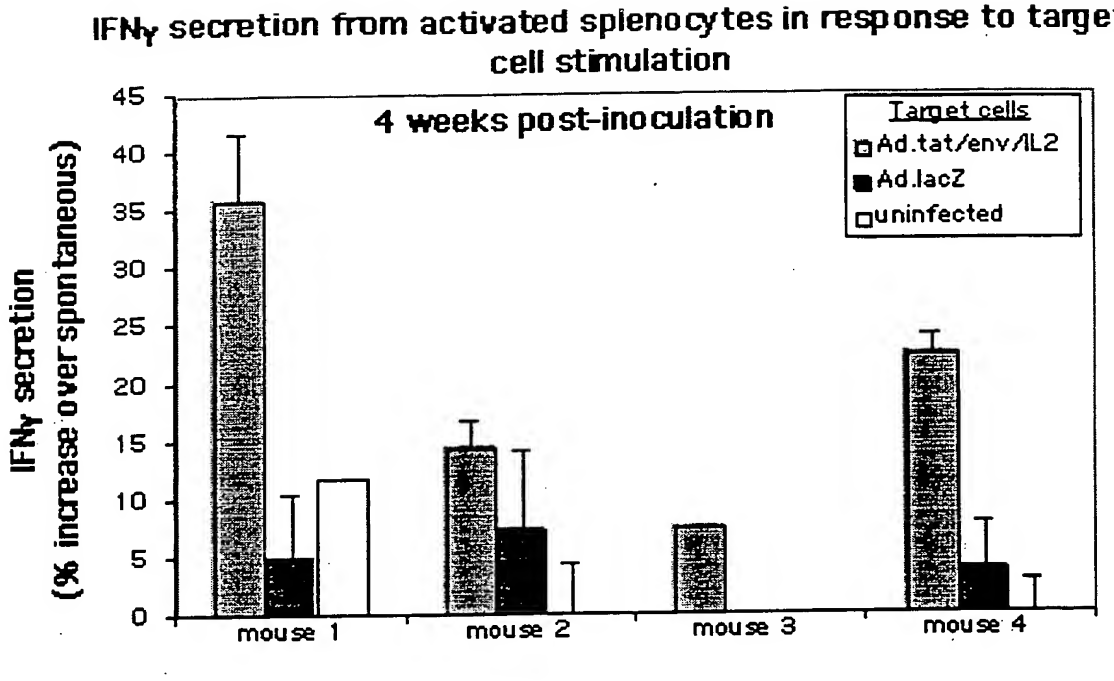

IFNγ secretion from activated splenocytes in response to target cell stimulation
4 weeks post-inoculation
Target cells
Ad.tat/env/IL2
Ad.lacZ
uninfected
IFNγ secretion
(% increase over spontaneous)
45
40
35
30
25
20
15
10
5
0
mouse 1
mouse 2
mouse 3
mouse 4

FIGURE 8A

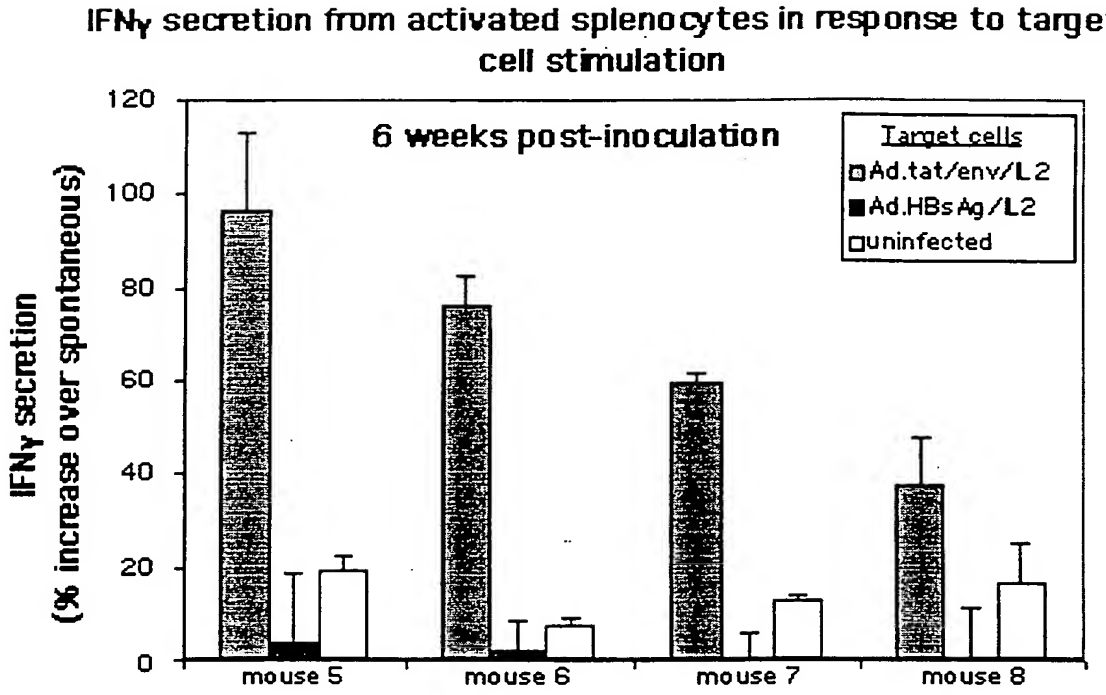

IFNγ secretion from activated splenocytes in response to target cell stimulation
6 weeks post-inoculation
Target cells
Ad.tat/env/L2
Ad.HBsAg/L2
uninfected
IFNγ secretion
(% increase over spontaneous)
120
100
80
60
40
20
0
mouse 5
mouse 6
mouse 7
mouse 8

FIGURE 8B

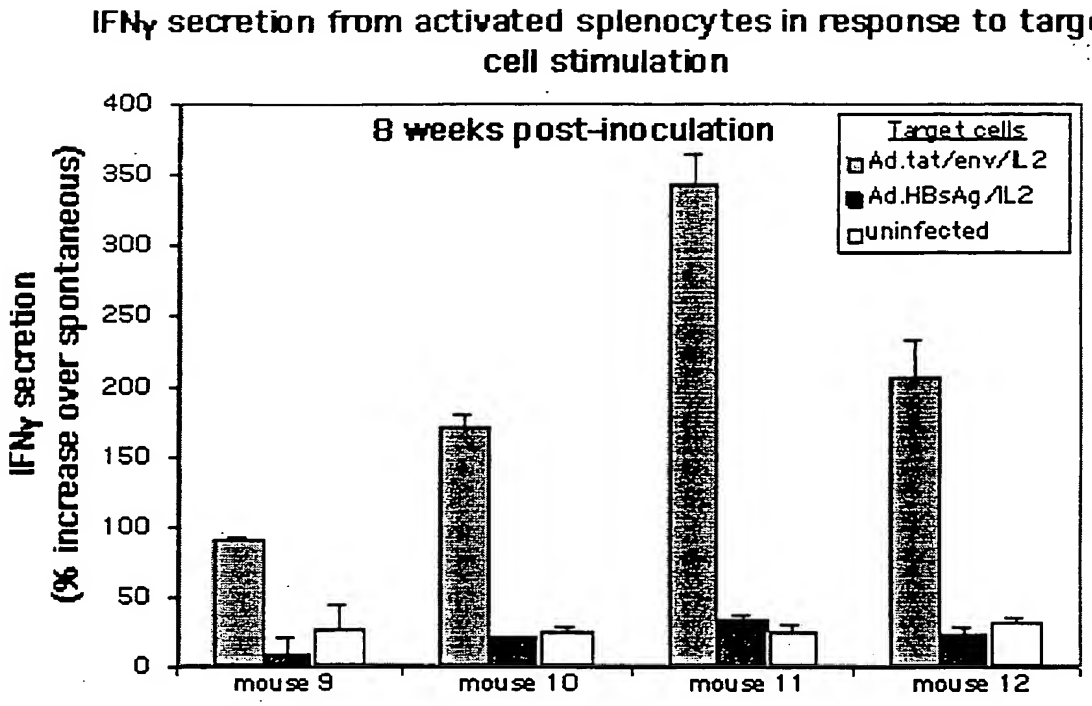

IFNγ secretion from activated splenocytes in response to target cell stimulation
8 weeks post-inoculation
Target cells
Ad.tat/env/IL2
Ad.HBsAg/IL2
uninfected
IFNγ secretion
(% increase over spontaneous)
400
350
300
250
200
150
100
50
0
mouse 9
mouse 10
mouse 11
mouse 12

FIGURE 8C

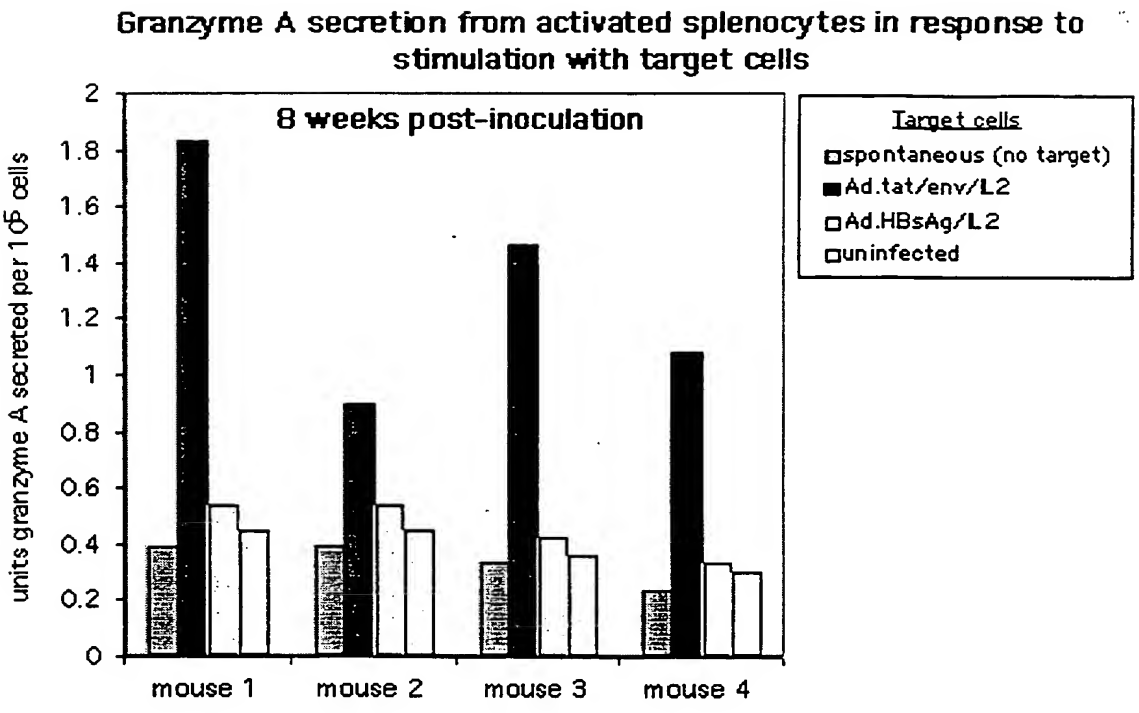

Granzyme A secretion from activated splenocytes in response to stimulation with target cells
8 weeks post-inoculation
units granzyme A secreted per 10⁵ cells
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
mouse 1
mouse 2
mouse 3
mouse 4
Target cells
spontaneous (no target)
Ad.tat/env/L2
Ad.HBsAg/L2
uninfected

FIGURE 9

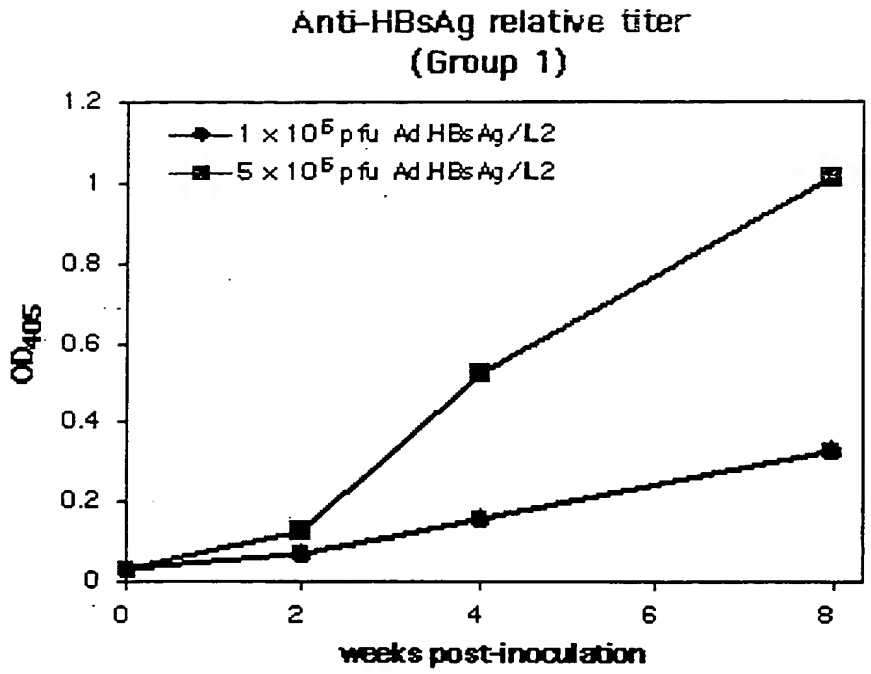


FIGURE 10A

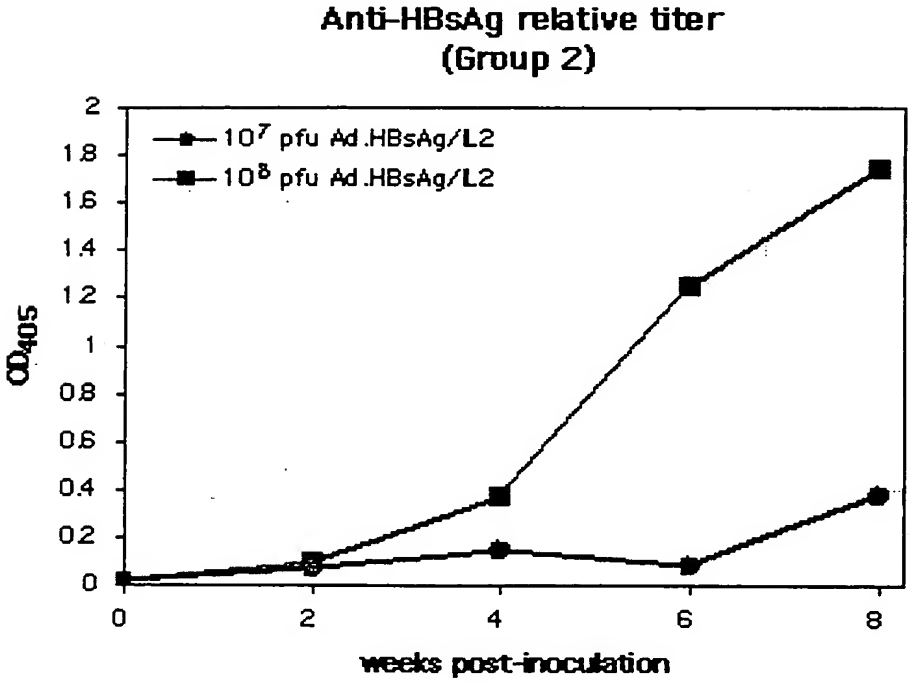


FIGURE 10B

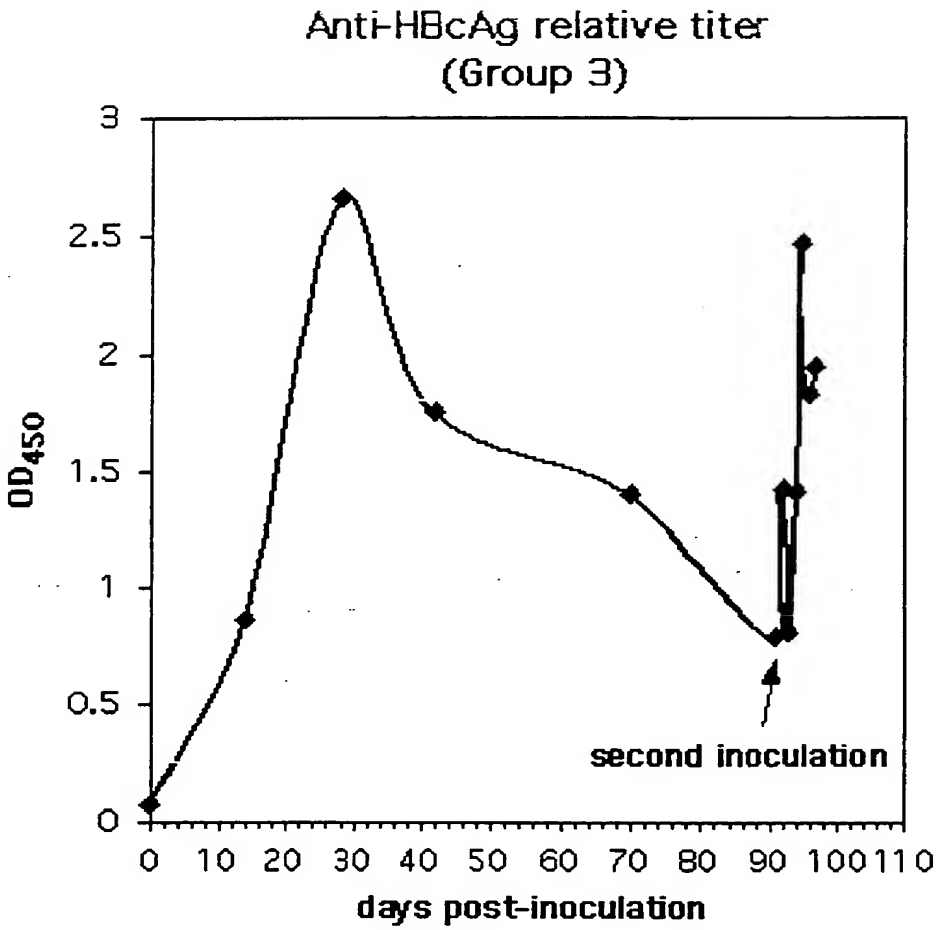

Anti-HBcAg relative titer
(Group 3)
OD450
3
2.5
2
1.5
1
0.5
0
0 10 20 30 40 50 60 70 80 90 100 110
days post-inoculation
second inoculation

FIGURE 11A

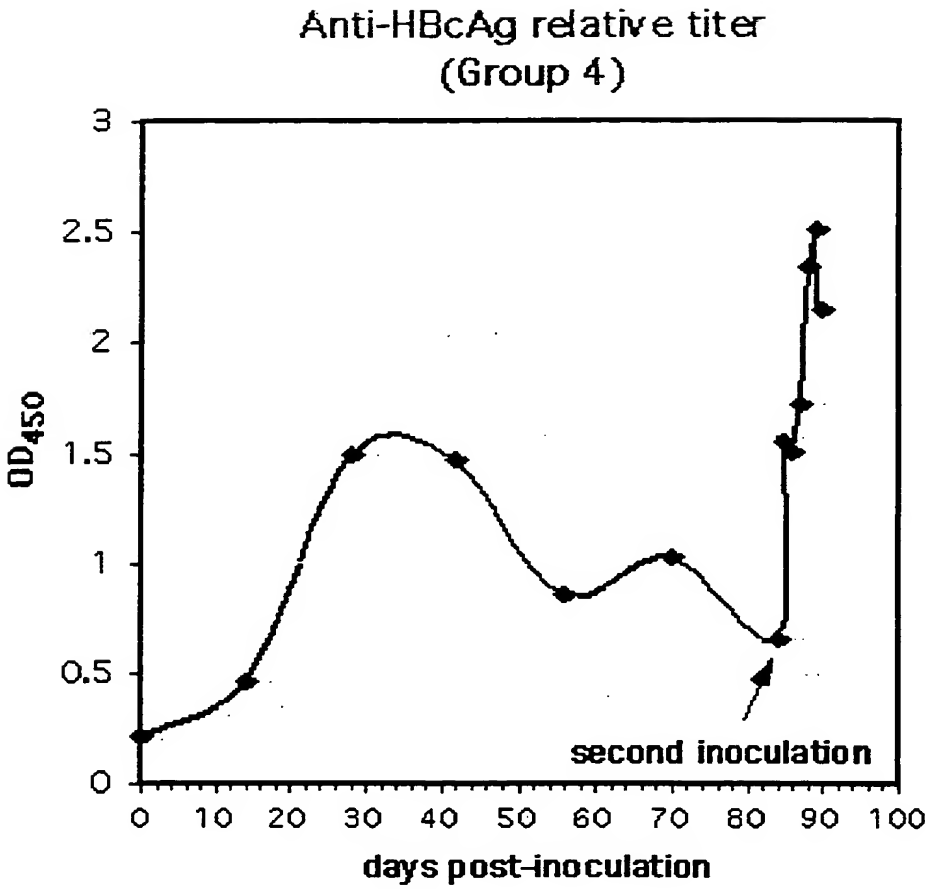
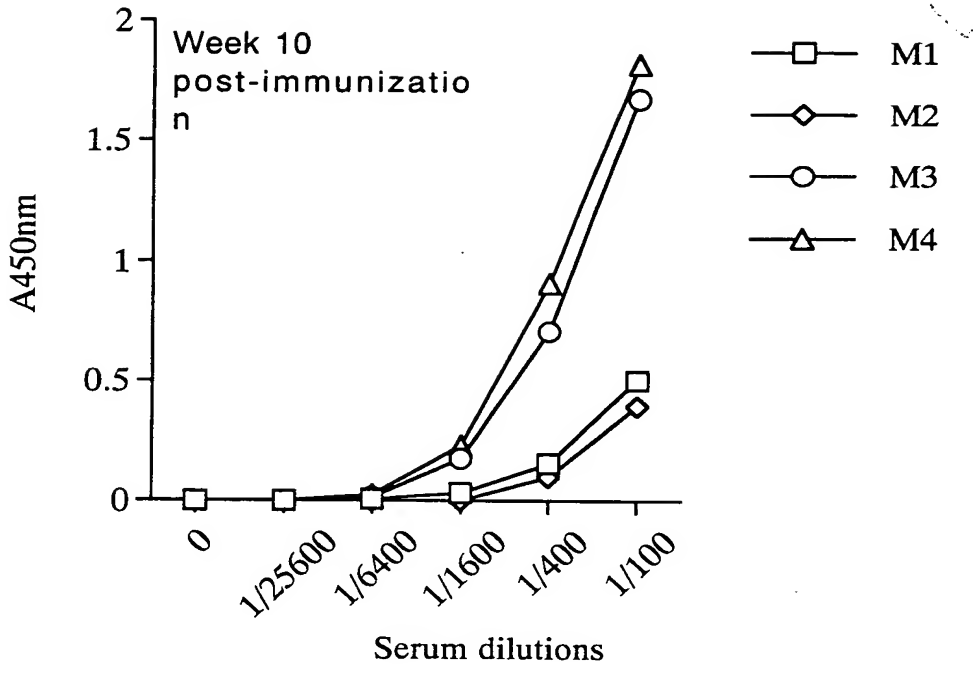

Anti-HBcAg relative titer
(Group 4)
OD450
3
2.5
2
1.5
1
0.5
0
0 10 20 30 40 50 60 70 80 90 100
days post-inoculation
second inoculation

FIGURE 11B

FIGURE 12

A.


Week 10 post-immunization
A450nm
2
1.5
1
0.5
0
0
1/25600
1/6400
1/1600
1/400
1/100
Serum dilutions
M1
M2
M3
M4

B.

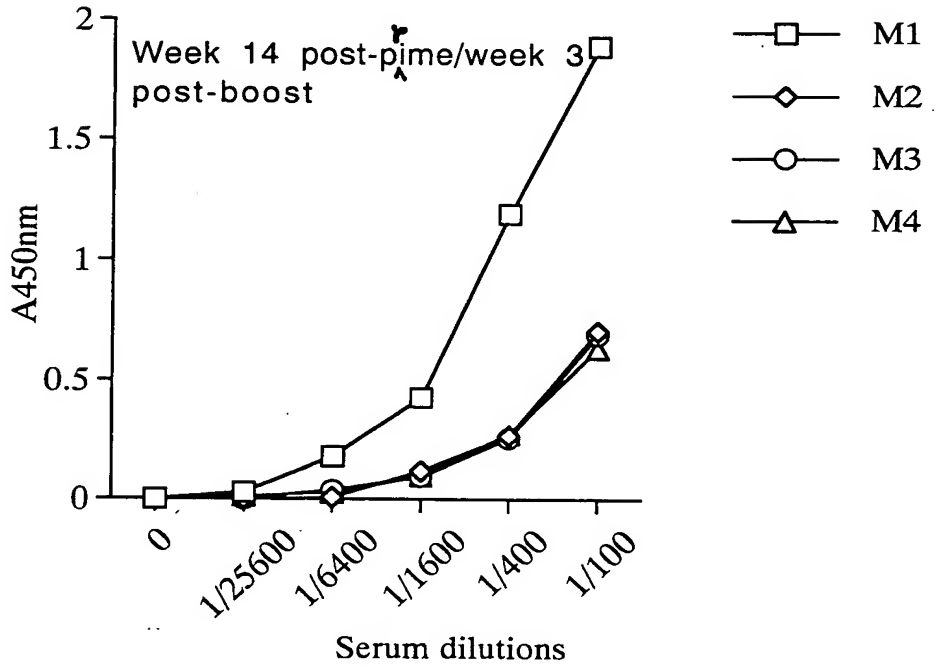
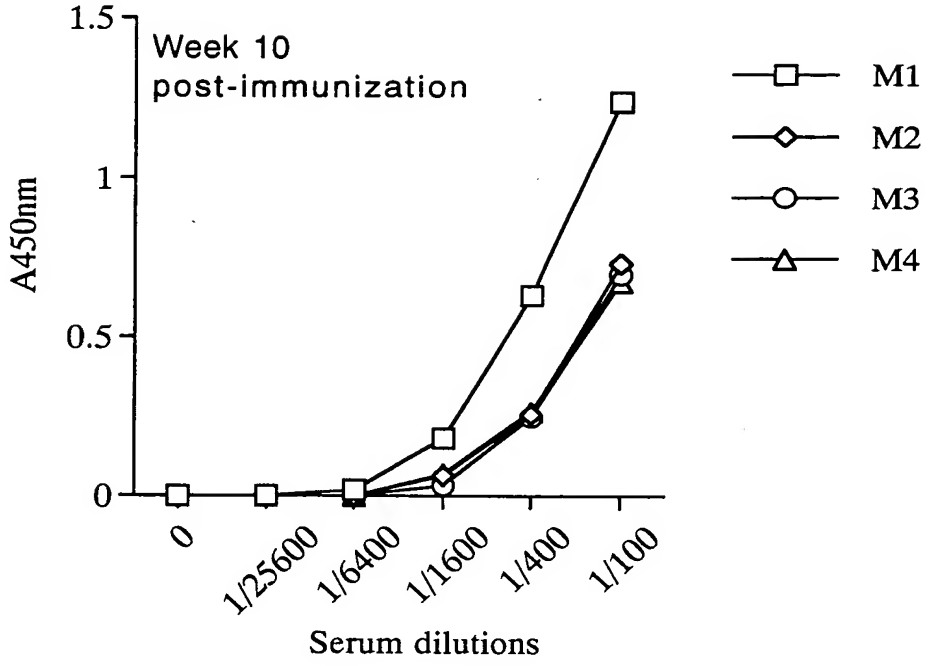

Week 14 post-prime/week 3 post-boost
A450nm
2
1.5
1
0.5
0
0
1/25600
1/6400
1/1600
1/400
1/100
Serum dilutions
M1
M2
M3
M4

FIGURE 13

A.


Week 10
post-immunization
A450nm
1.5
1
0.5
0
0
1/25600
1/6400
1/1600
1/400
1/100
Serum dilutions
M1
M2
M3
M4

B.

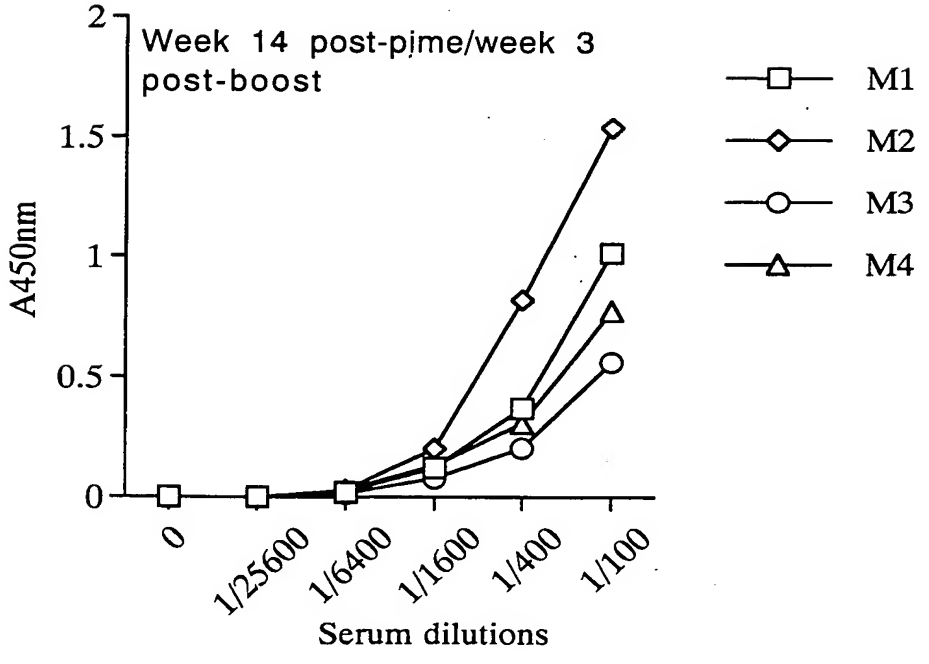
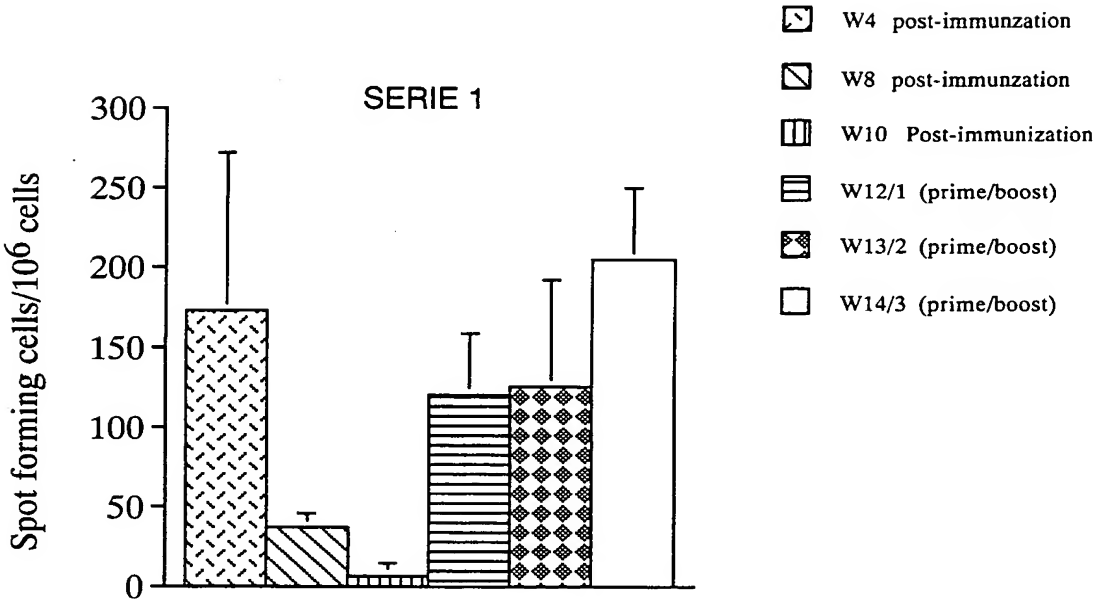

Week 14 post-pime/week 3
post-boost
A450nm
2
1.5
1
0.5
0
0
1/25600
1/6400
1/1600
1/400
1/100
Serum dilutions
M1
M2
M3
M4

FIGURE 14

Gag-specific IFNγ secreting splenic cells after immunization of mice with Ad(3C, Gag, Env)

A.



B.

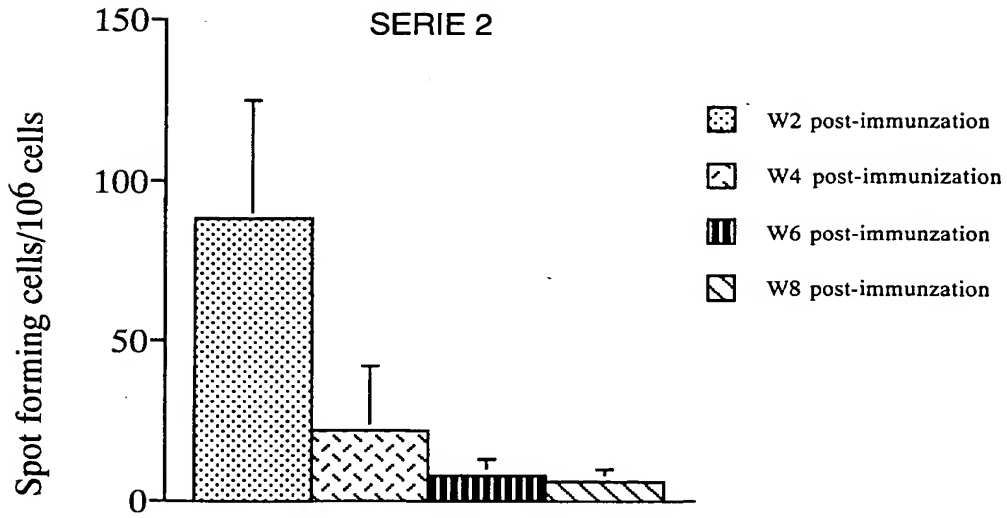


FIGURE 15 L23: ELISPOT for IFNγ secretion: Serie1 spleen cells from mice at week W13/2 (post-prime/boost)

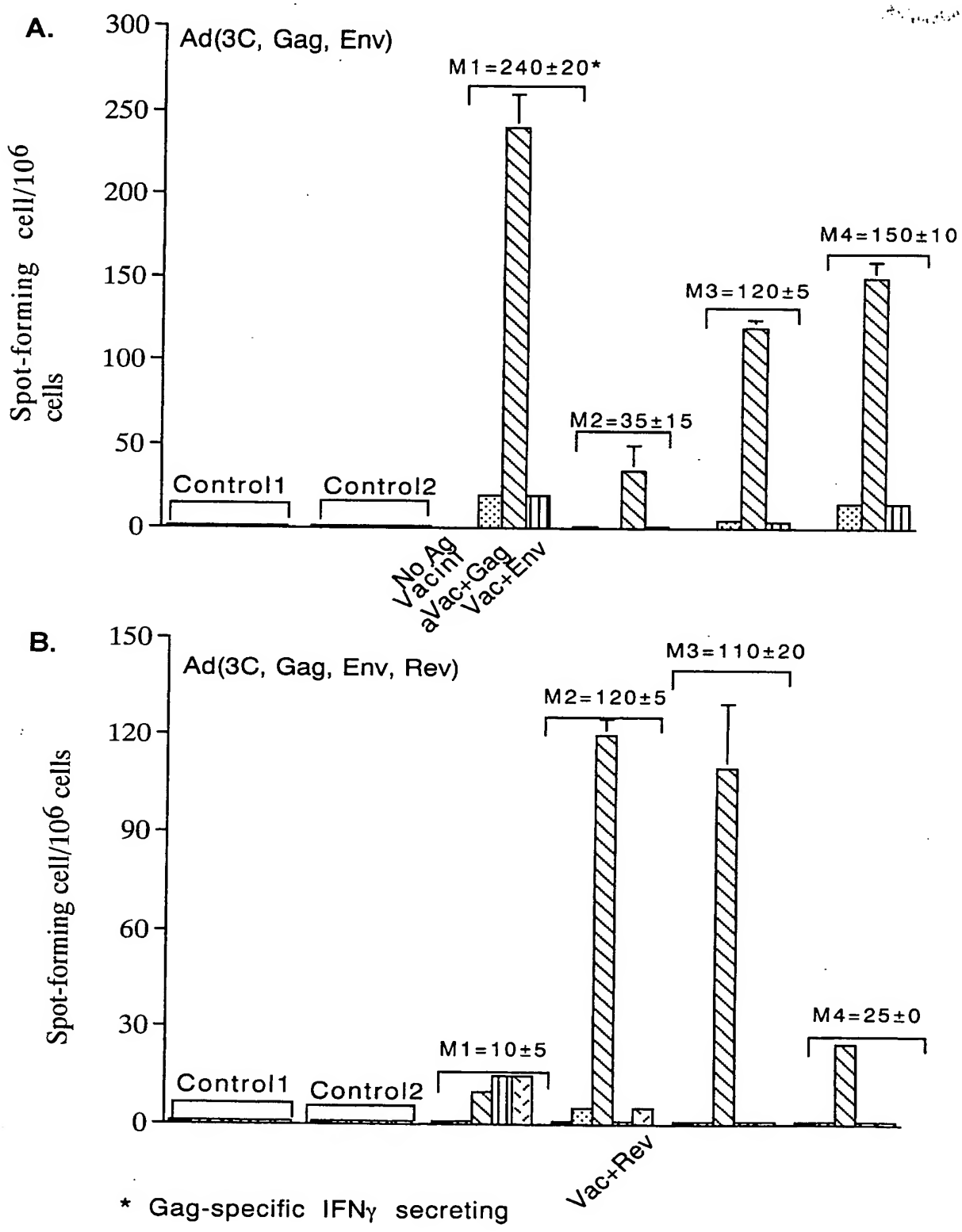
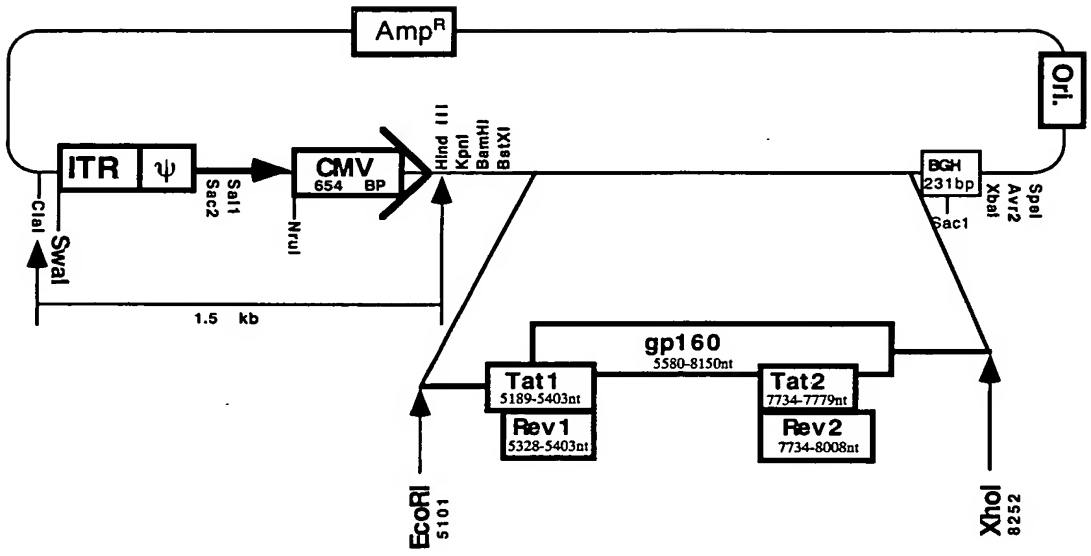


FIGURE 16 Ad-E.T.R/ IL2 (from BH10 strain)

A. pLAd-E.T.R



B. pRAd.ORF6-IL2

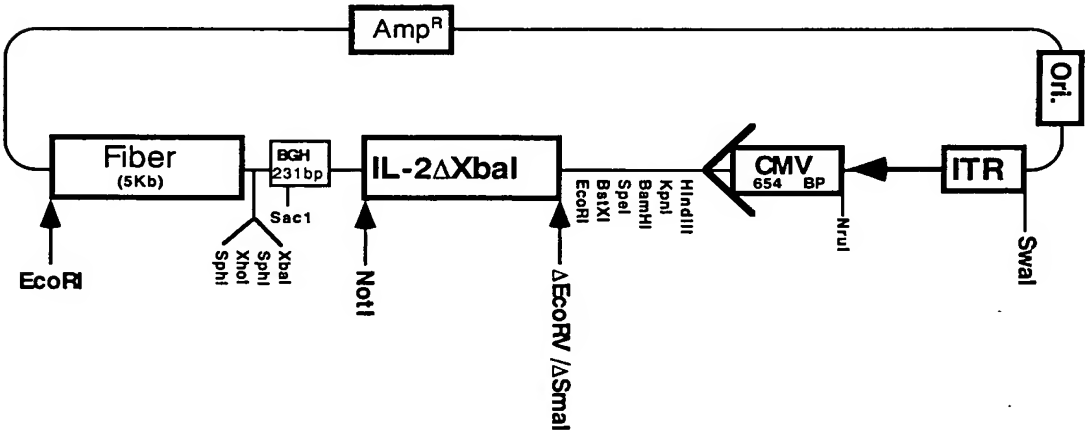
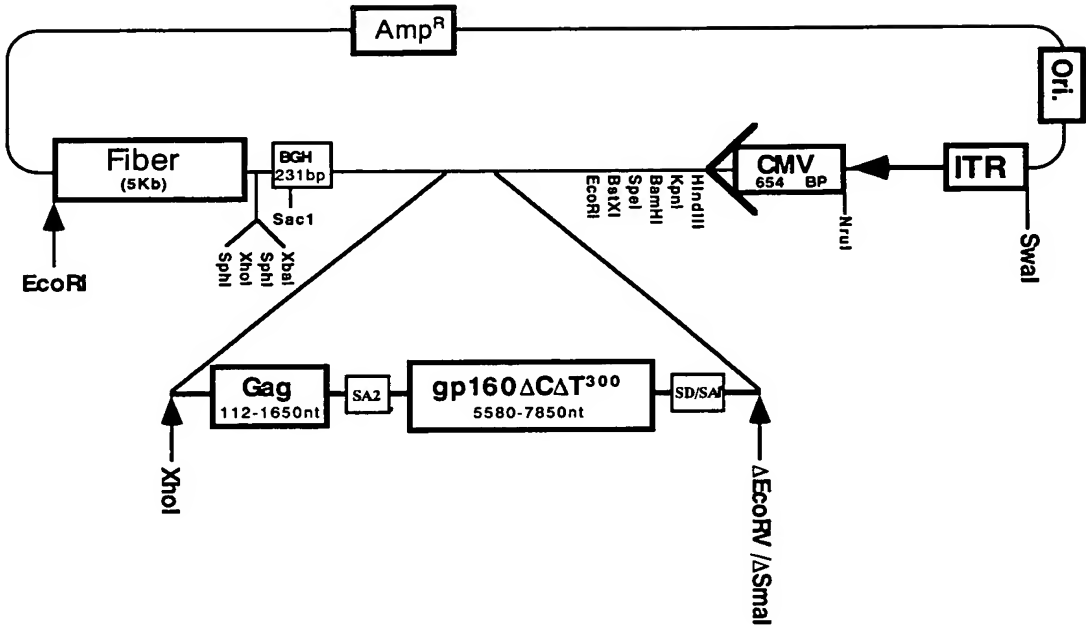


FIGURE 17 Ad-3C/E^{m}ΔCΔT^{300}–G (from BH10 strain)

A. pRAd.ORF6-E^{m}ΔCΔT^{300}–G



B. pLAd-3C

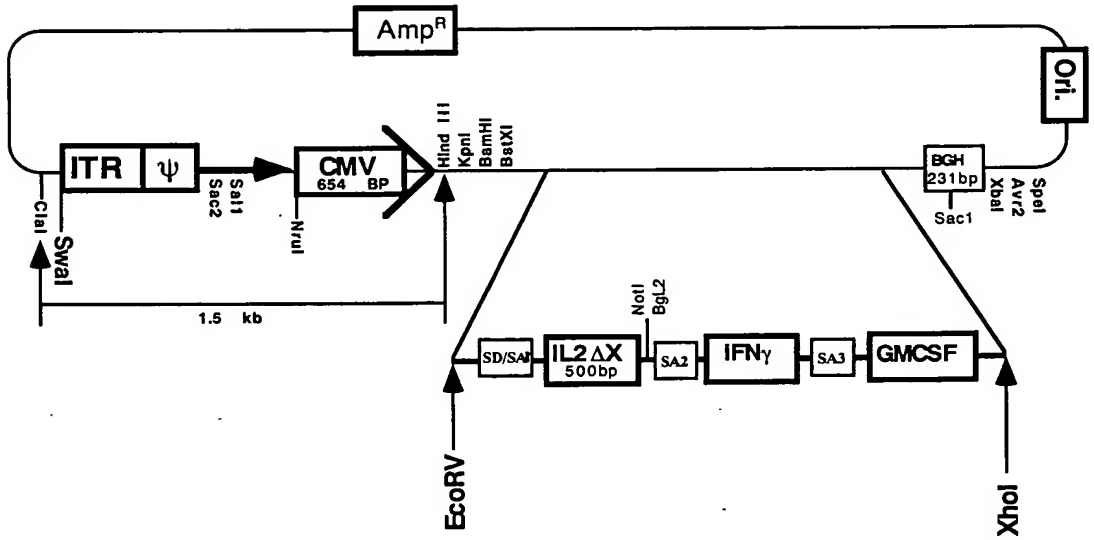


FIGURE 18

pRAd.ORF6-E^{m}ΔCΔT^{99}.T.R-G

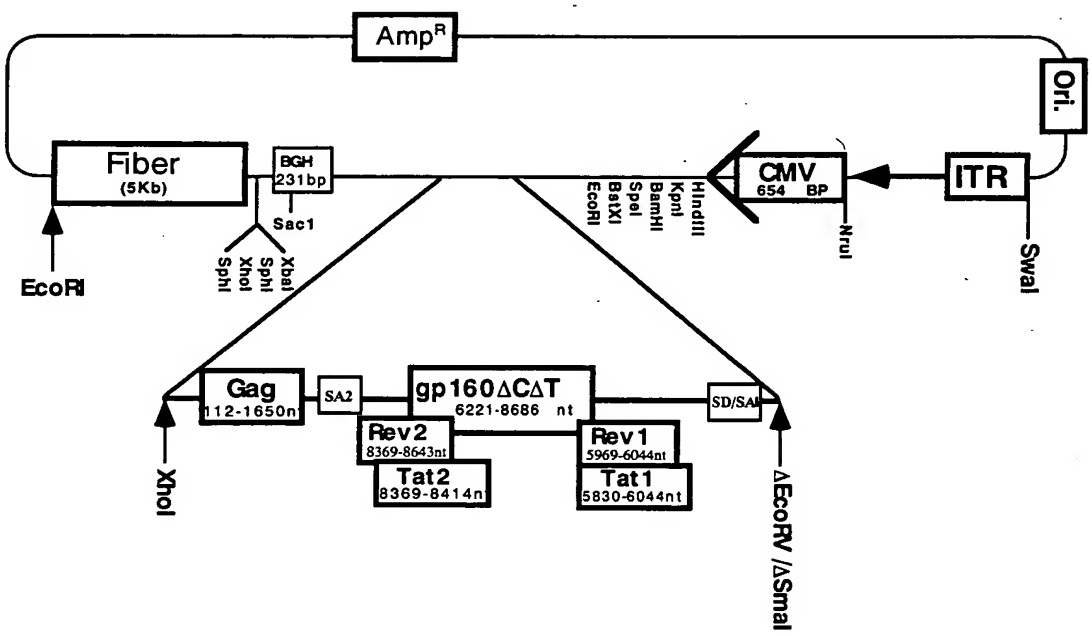
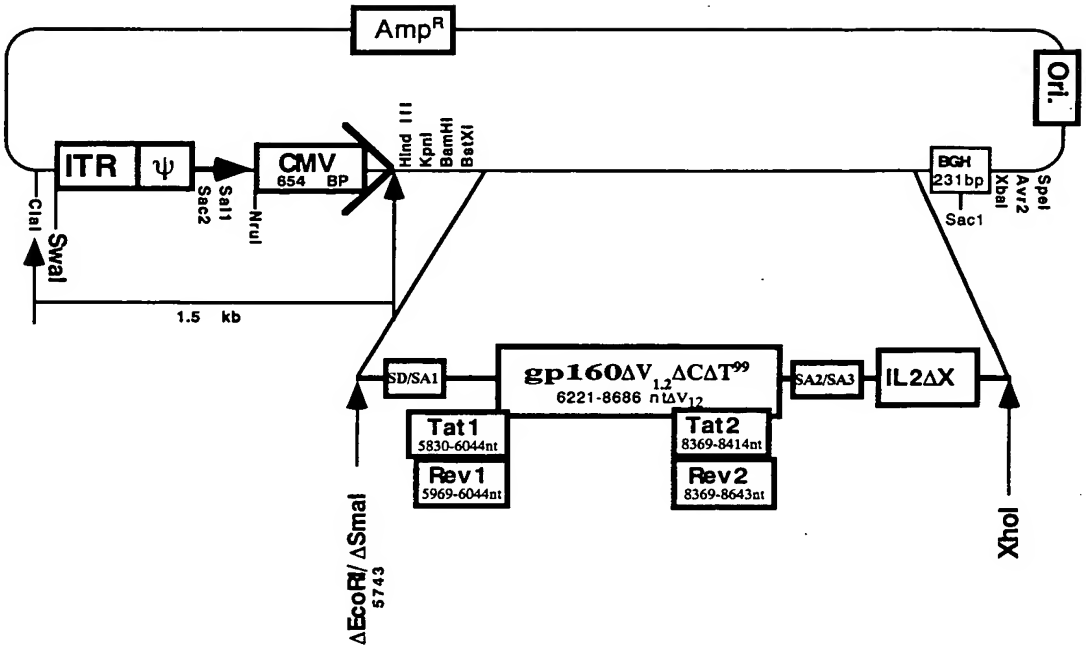


FIGURE 19

A. pLAd-E$^{m}\Delta V_{1.2}\Delta C\Delta T.T.R$-IL2



B. pRAd.ORF6-G.IL2

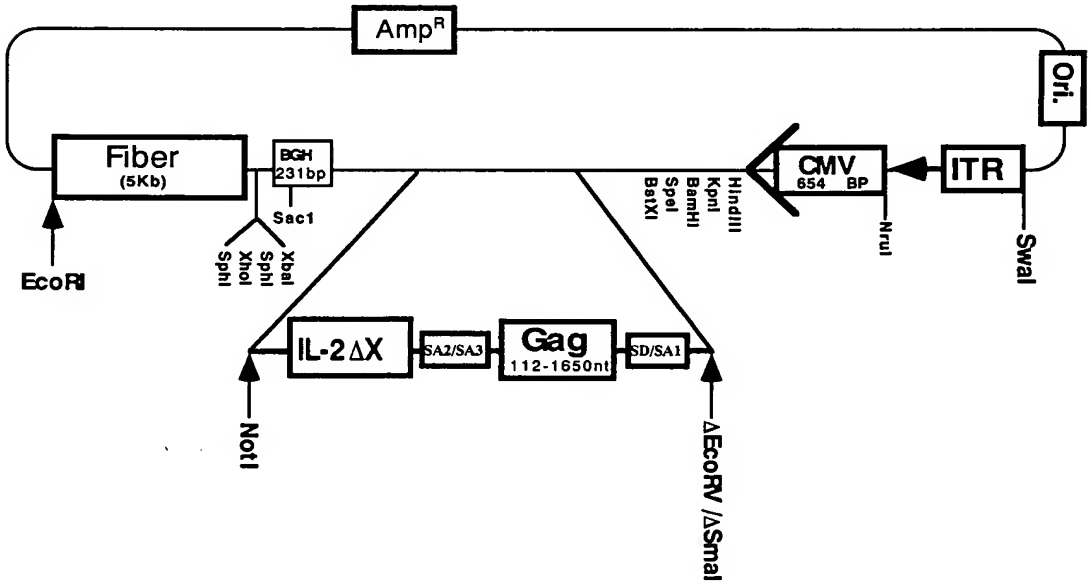


FIGURE 20

pLAd-ETRN

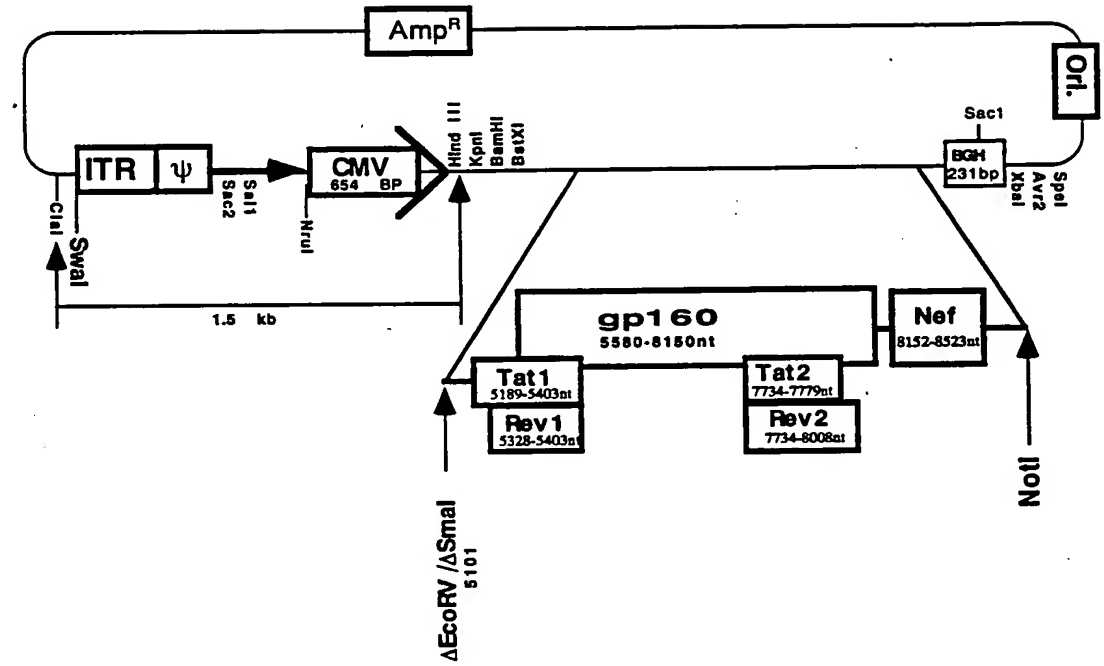


FIGURE 21

pLAd-E$^{m}\Delta$C.N

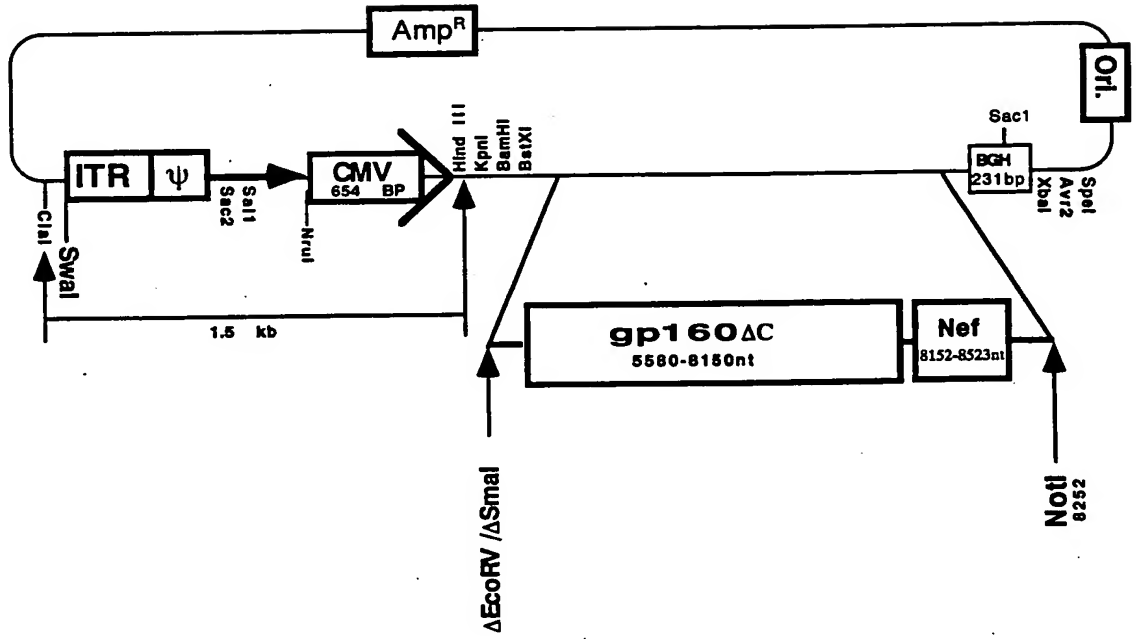


FIGURE 22

pLAd-E^{m}ΔCΔT^{300}.T

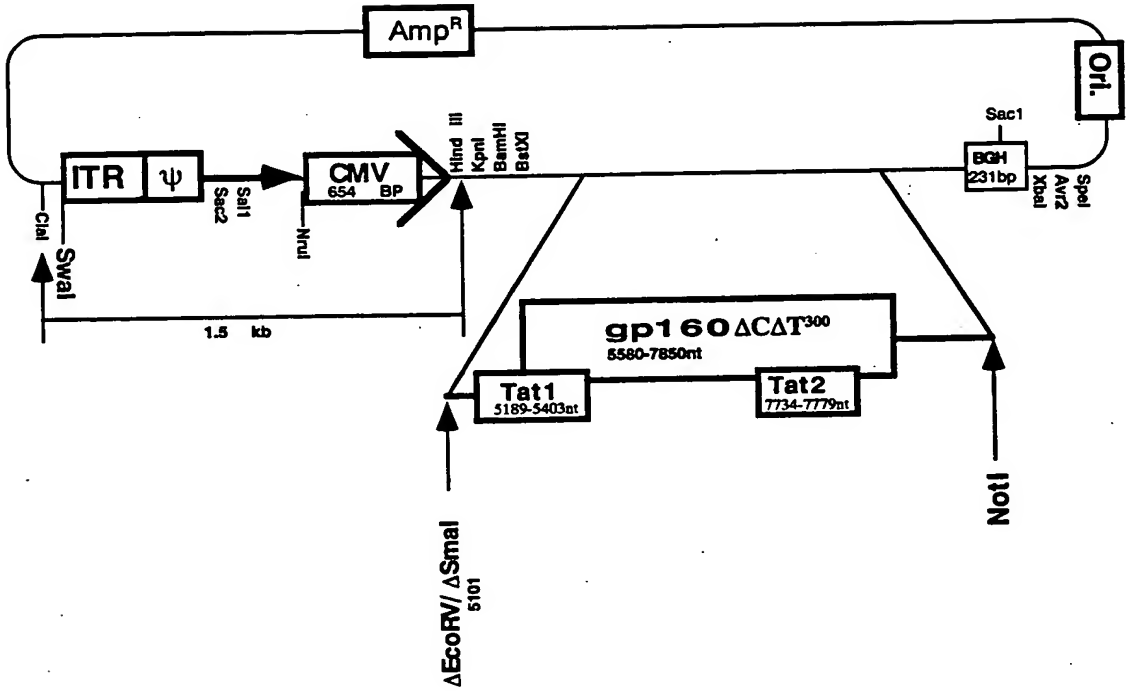
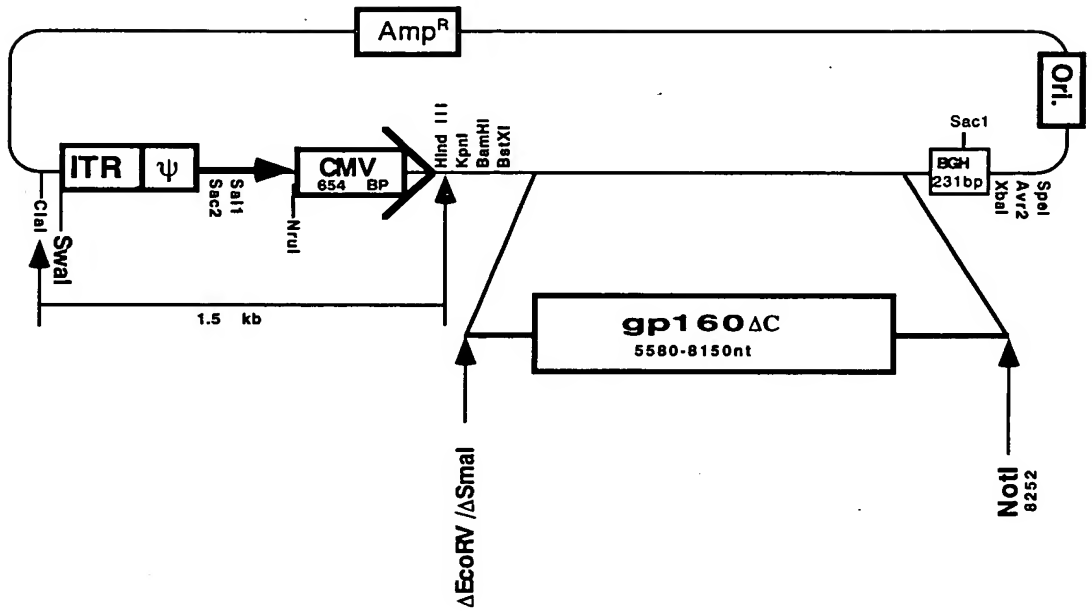


FIGURE 23

A. pLAd-$E^m\Delta C$



B. pRAd.ORF6-$E^m\Delta C$

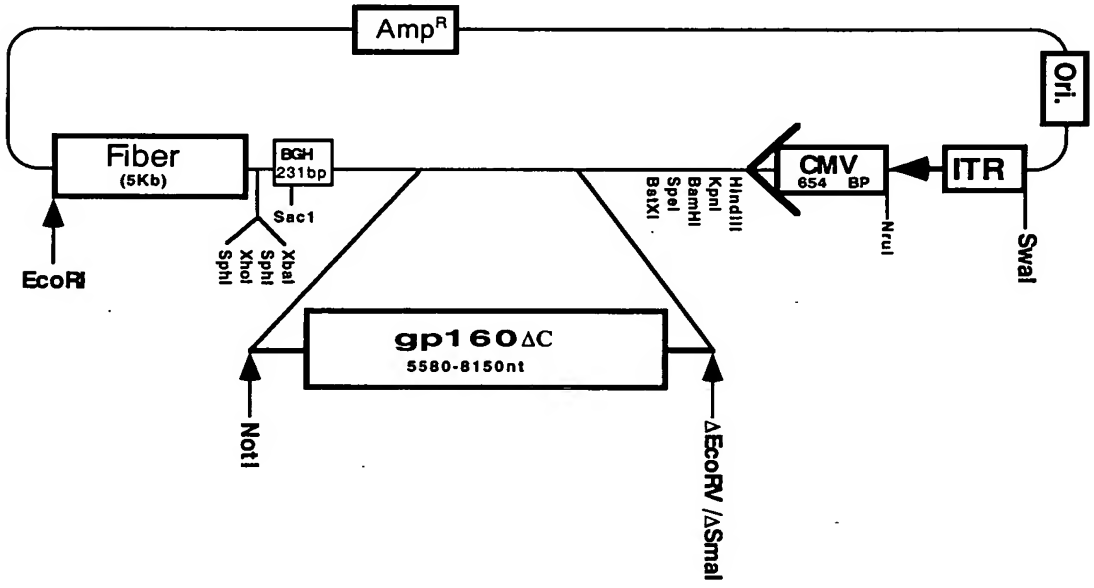
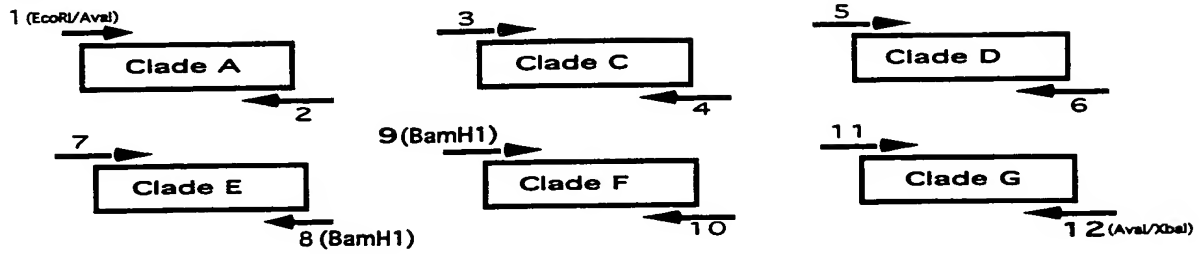
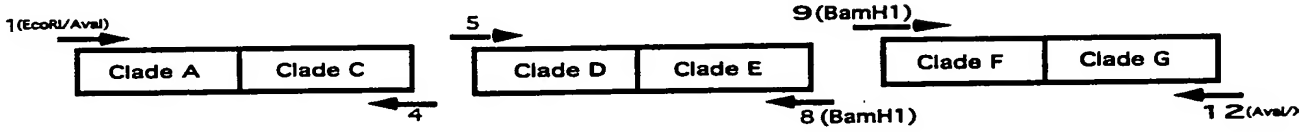


FIGURE 24

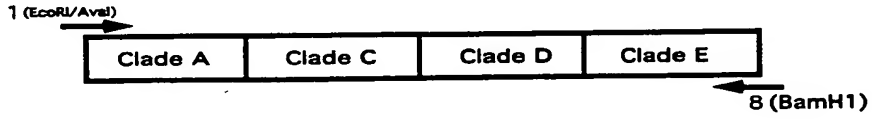
Step 1. Amplification of each individual clade A-G



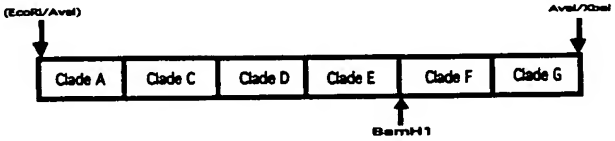
Step 2. Amplification of every two Clades AC, DE, FG



Step 3. Amplification of Clades ACDE



Step 4. Cloning the multi-clades into pSP73 vector



Step 5. Generating of a duplicated multi-clades

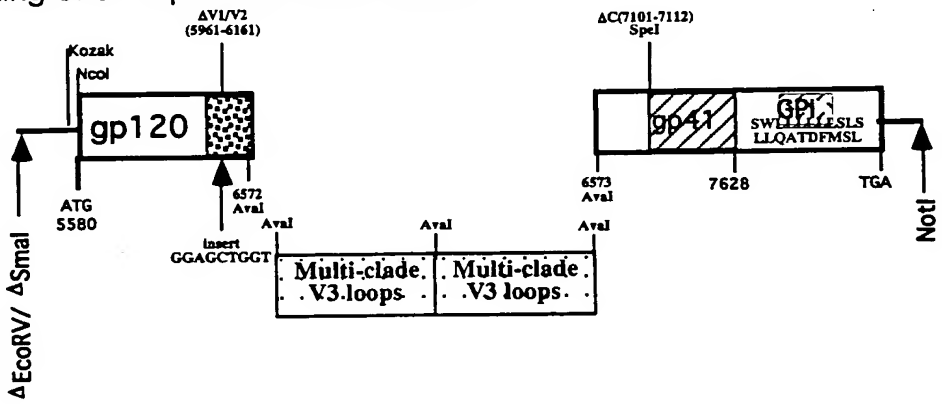


FIGURE 25

pLAd-E^{m}.V3

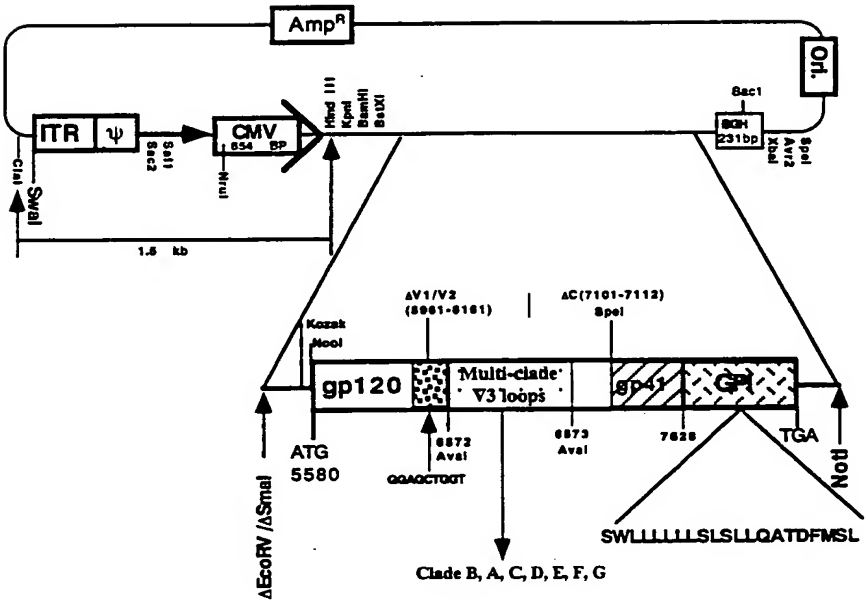


FIGURE 26

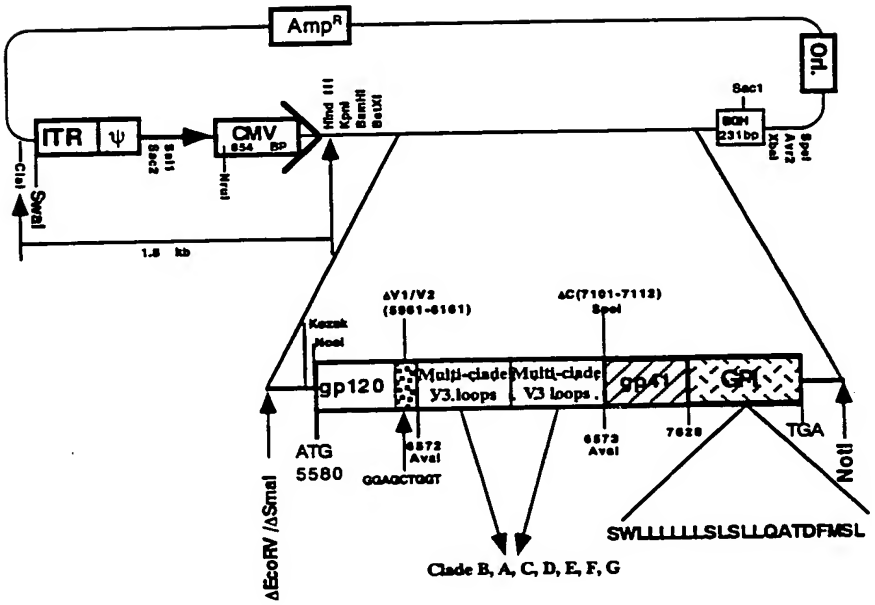
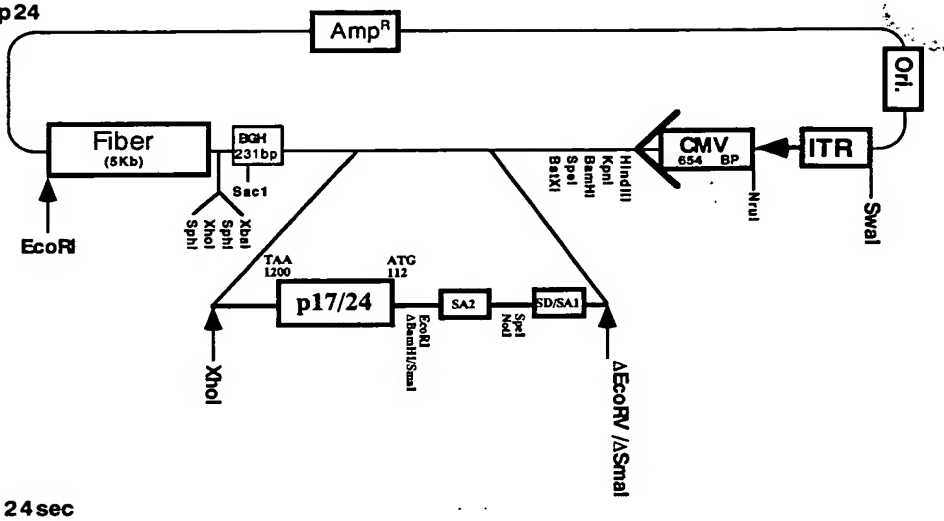
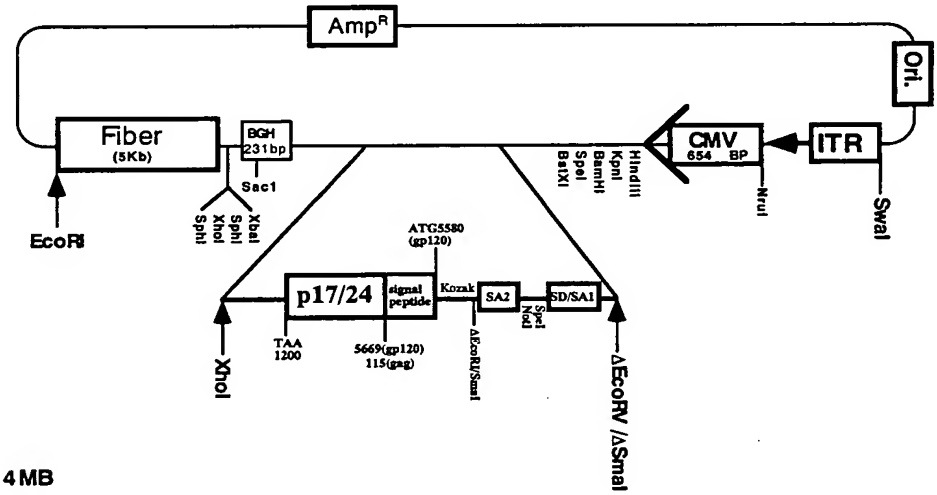

Amp^R
ori.
ITR
ψ
CMV
654 bp
Hind III
KpnI
BamHI
BstXI
Sac1
SD
231bp
Xba1
Ava1
Spe1
Cla1
SwaI
1.8 kb
Nhe1
Sph1
Sac2
ΔV1/V2
(5961-6161)
ΔC(7101-7112)
SpeI
Kozak
NcoI
gp120
Multi-clade
V3.loops
Multi-clade
V3 loops.
gp41
GPI
ATG
5580
6572
AvaI
GGAAGCTGGT
6573
AvaI
7626
TGA
NotI
ΔEcoRV /ΔSmaI
SWLLLLLLLSLSLLQATDFMSL
Clade B, A, C, D, E, F, G

FIGURE 27

A. pRAd.ORF6-p17/p24



B. pRAd.ORF6-p17/24sec



C. pRAd.ORF6-p17/24MB

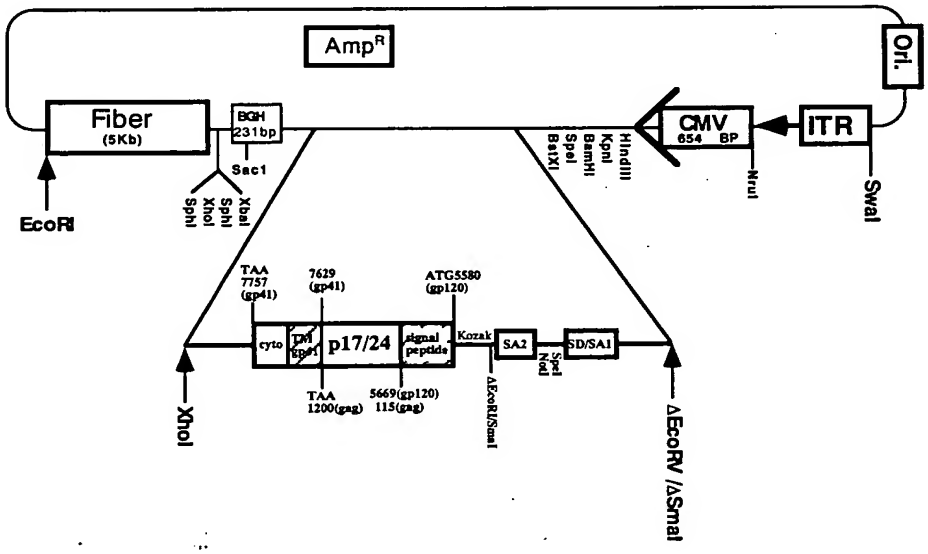
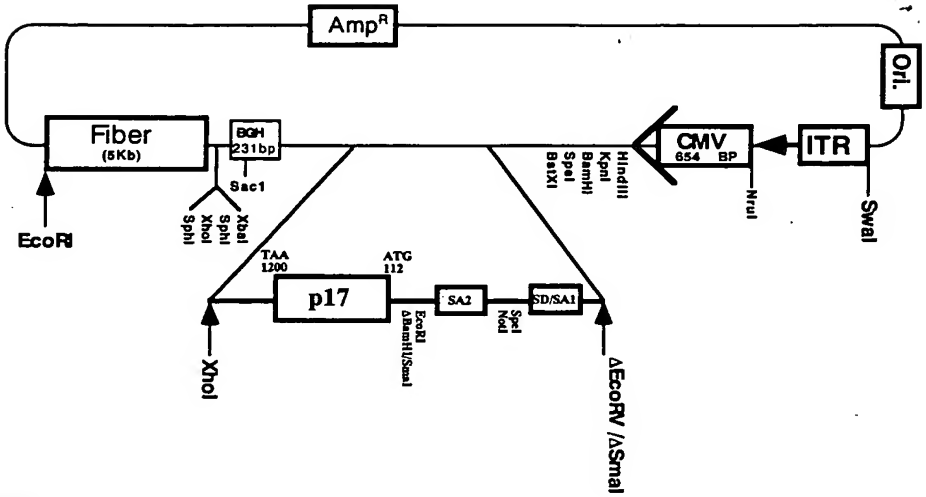
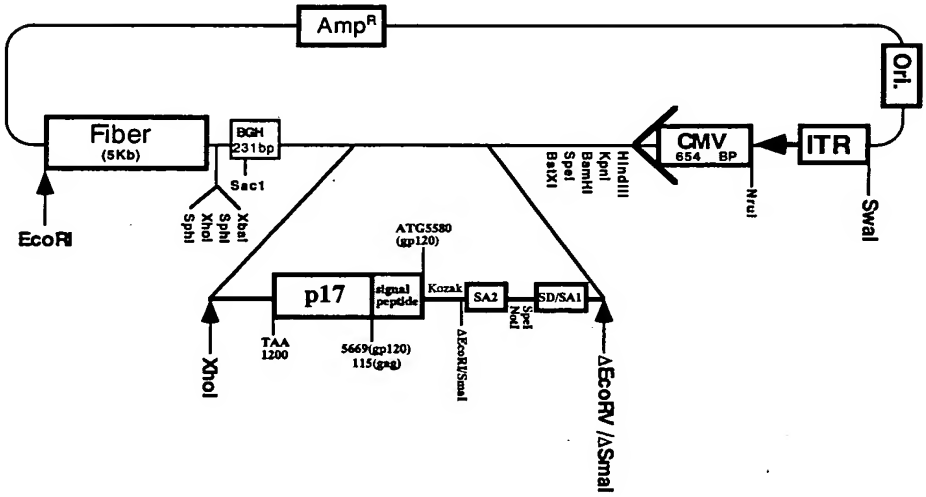


FIGURE 28

A. pRAd.ORF6-p17



B. pRAd.ORF6-p17sec



C. pRAd.ORF6-p17MB

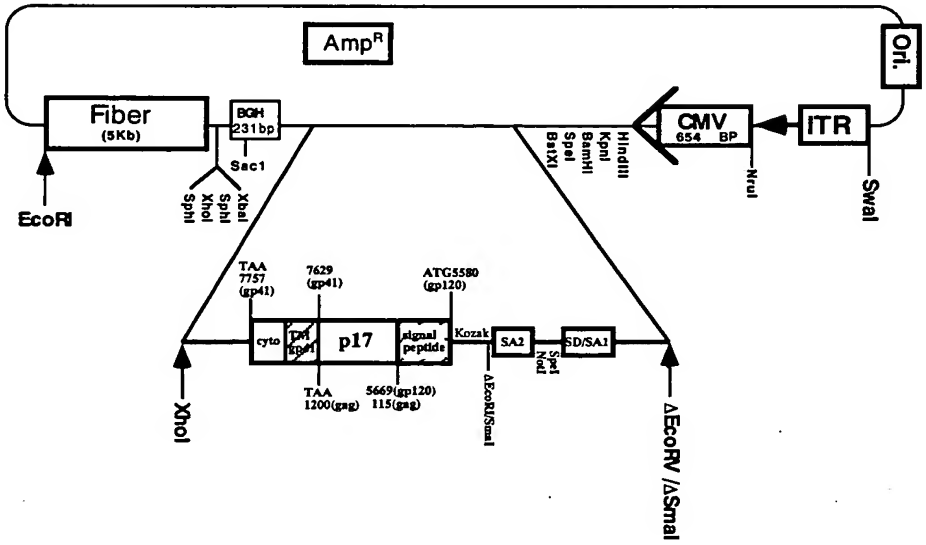
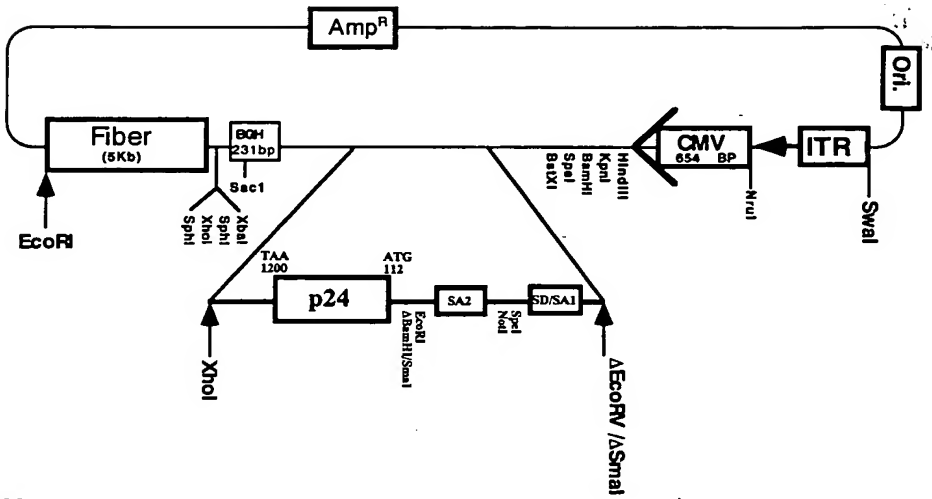
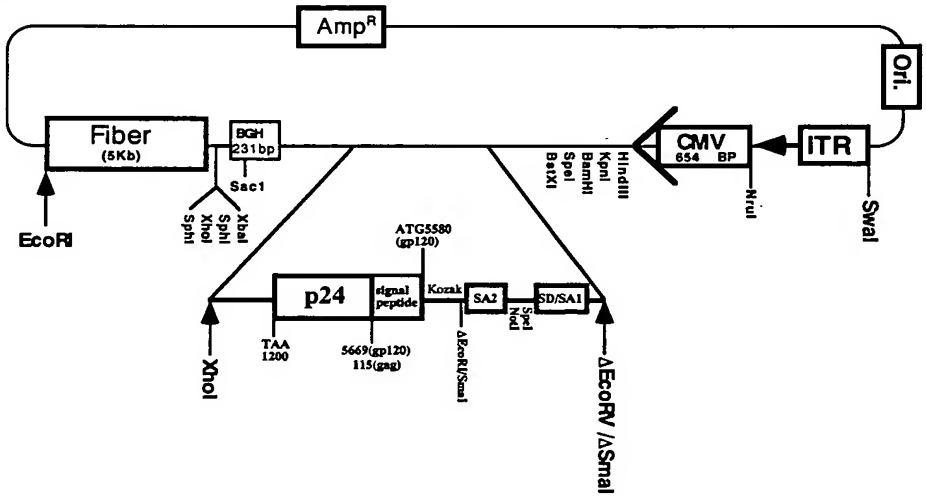


FIGURE 29

A. pRAd.ORF6-p24



B. pRAd.ORF6-p24sec



C. pRAd.ORF6-p24MB

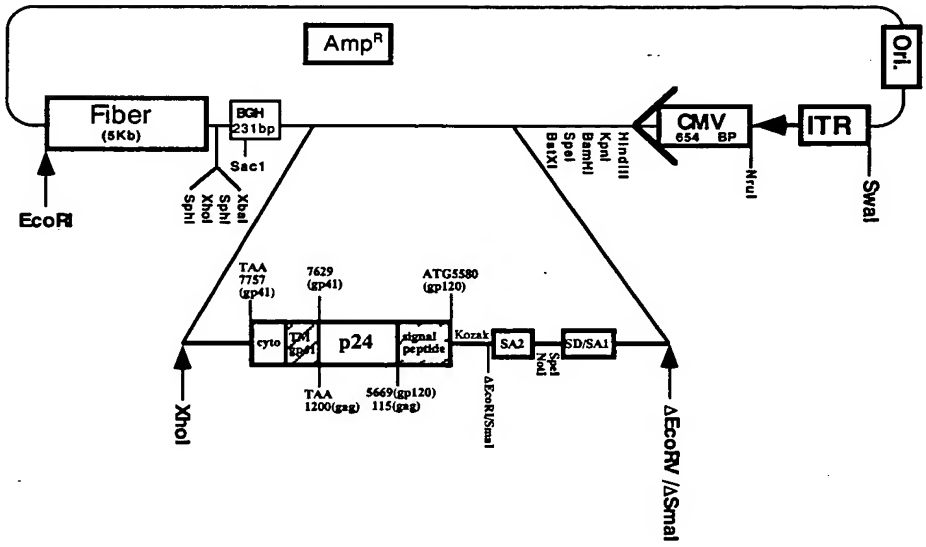


FIGURE 30 Adenoviral construct of Ad-E^{m}.V3^{m}/p17/24MB

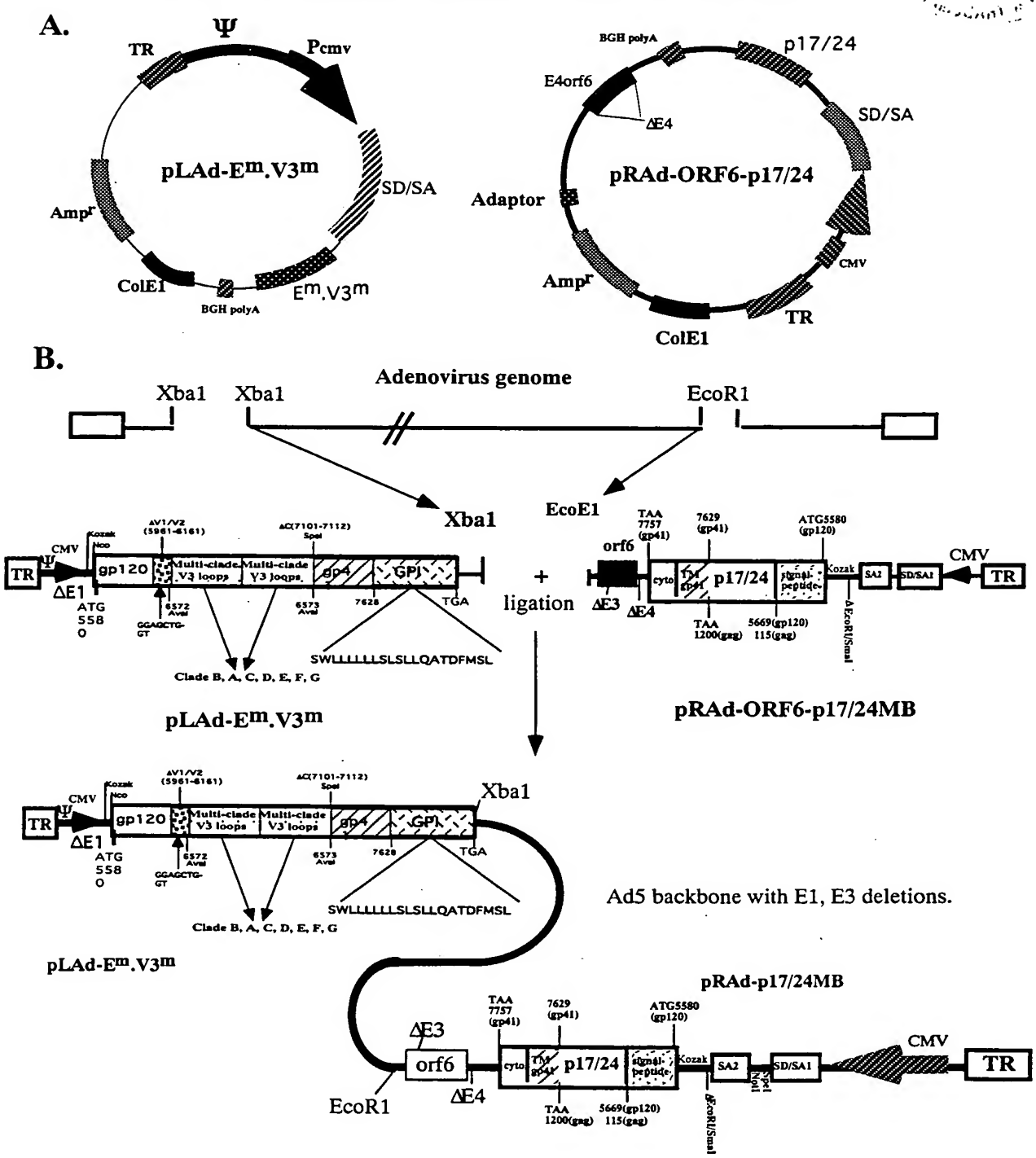


FIGURE 31 Adenoviral construct of Ad-E^{m}.V3^{m}/p17MB

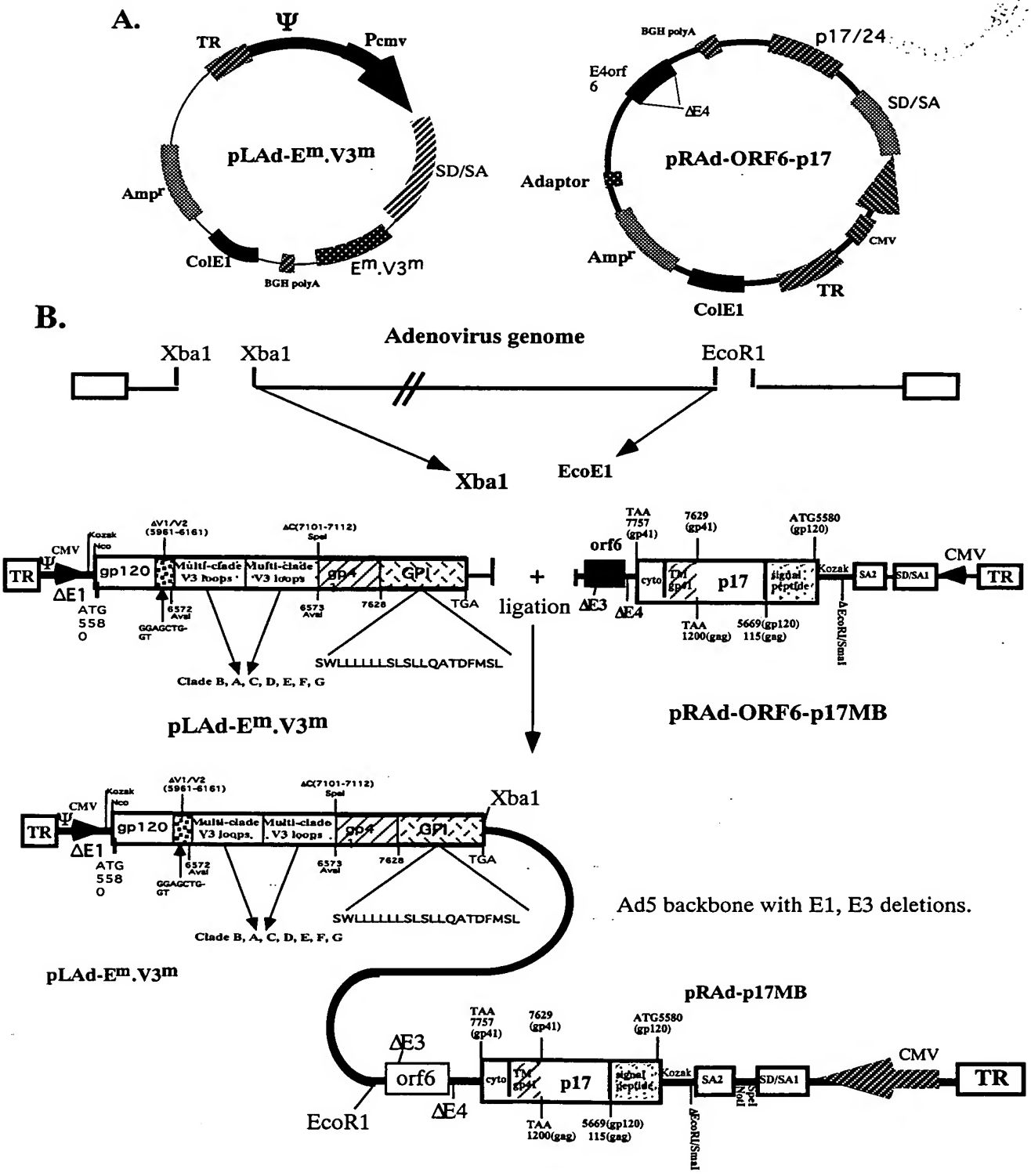


FIGURE 32 Adenoviral construct of Ad-$E^{m}.V3^{m}$/p24MB

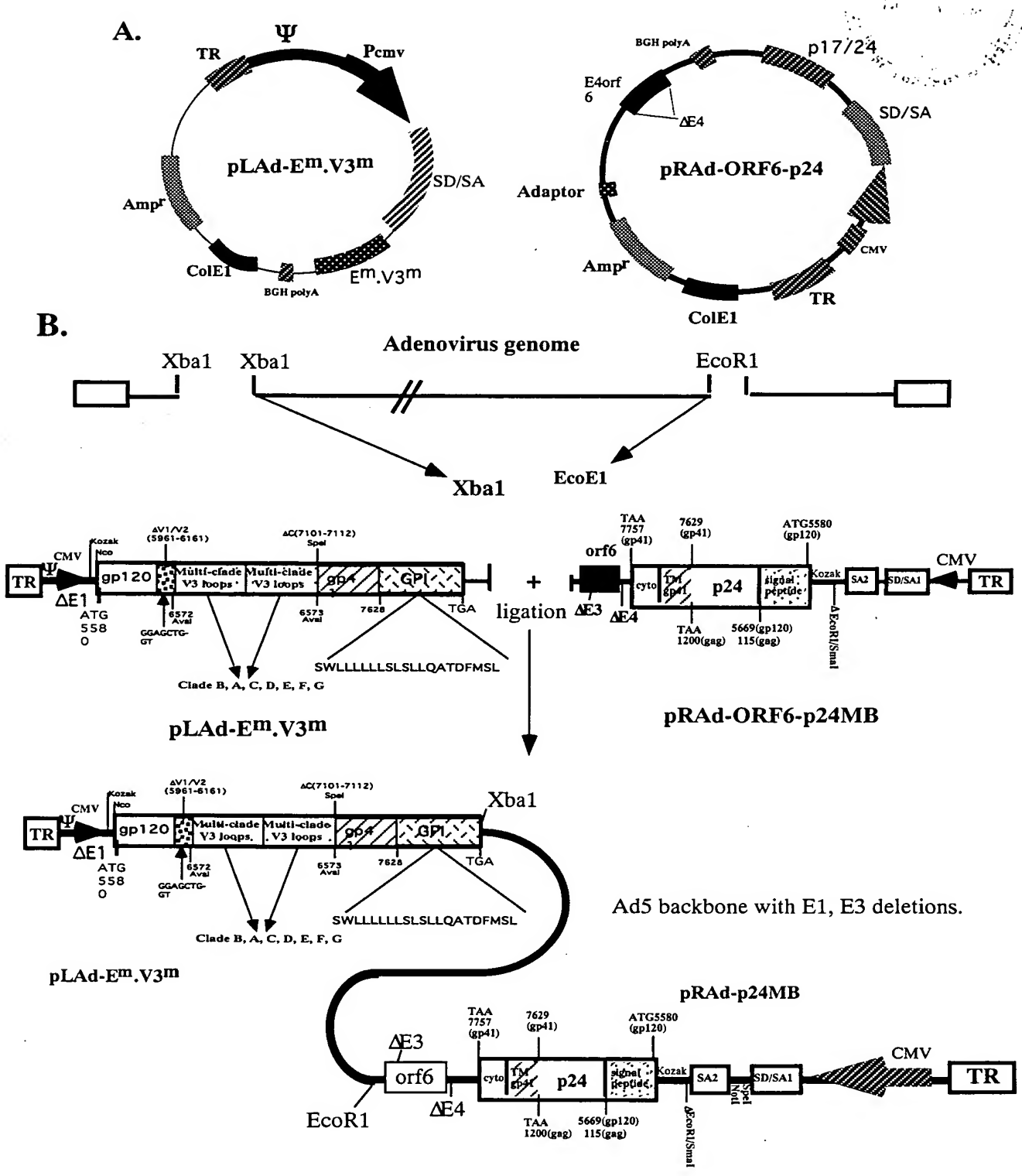


FIGURE 33

pLAd-E^{m}ΔCΔT^{300}.V3^{m}.T.

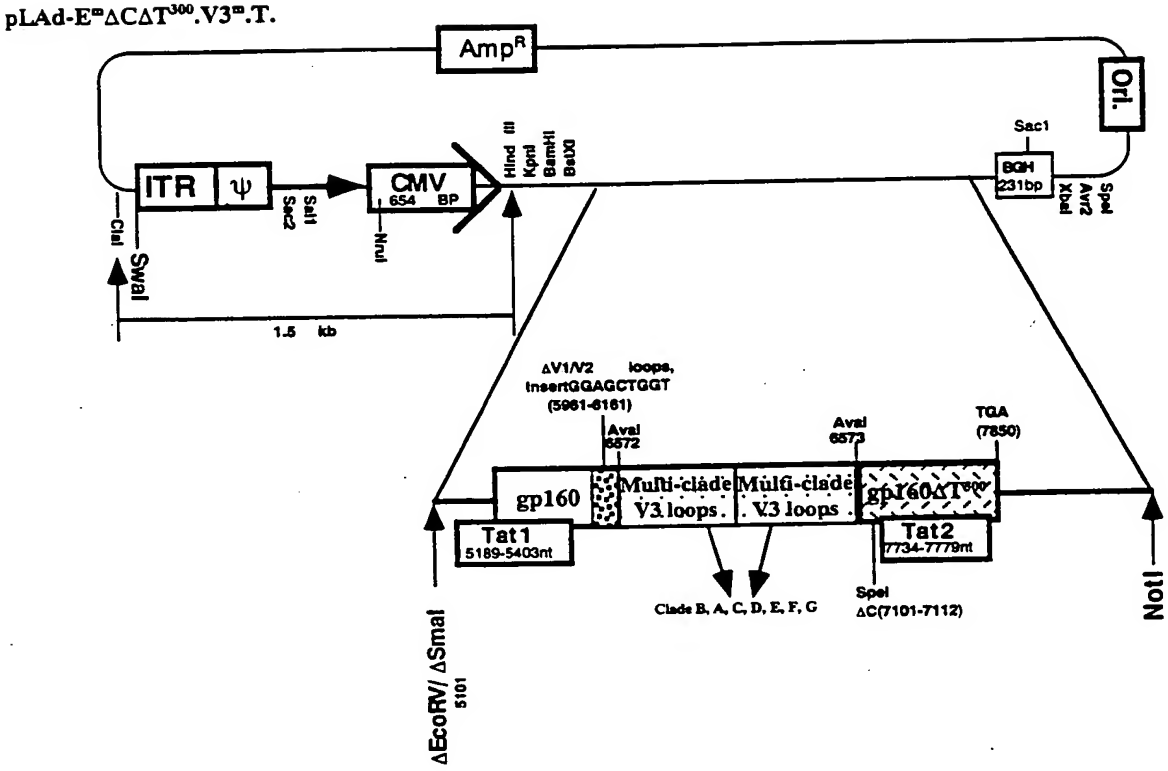
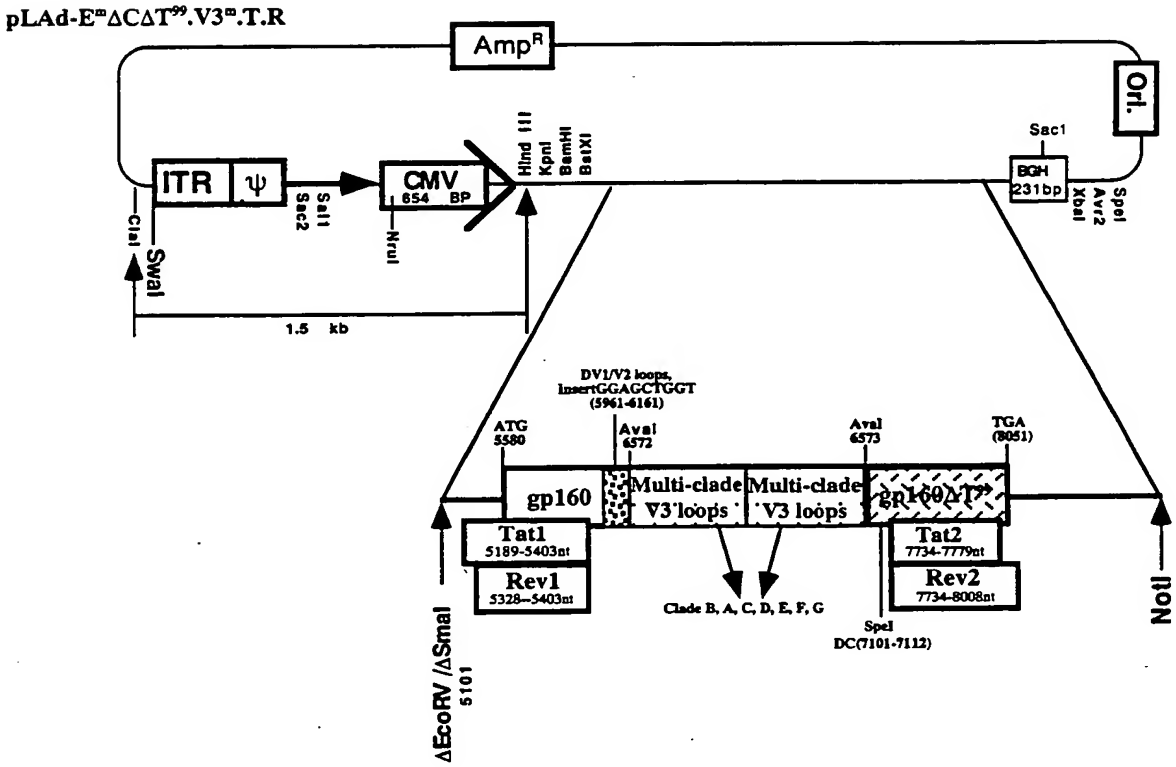


FIGURE 34


pLAd-E^{m}ΔCΔT^{99}.V3^{m}.T.R
Amp^{R}
Ori.
Sac1
BGH
231bp
SpeI
Avr2
XbaI
ITR
ψ
SalI
Sac2
CMV
654 BP
NruI
Hind III
KpnI
BamHI
BstXI
ClaI
SwaI
1.5 kb
DV1/V2 loops,
InsertGGAGCTGGT
(5961-6161)
ATG
5580
AvaI
6572
AvaI
6573
TGA
(8051)
gp160
Multi-clade
V3 loops
Multi-clade
V3 loops
gp160ΔT^{99}
Tat1
5189-5403nt
Rev1
5328--5403nt
Tat2
7734-7779nt
Rev2
7734-8008nt
Clade B, A, C, D, E, F, G
SpeI
DC(7101-7112)
NotI
ΔEcoRV /ΔSmaI
5101

pRAd.ORF6-G.PI

FIGURE 35

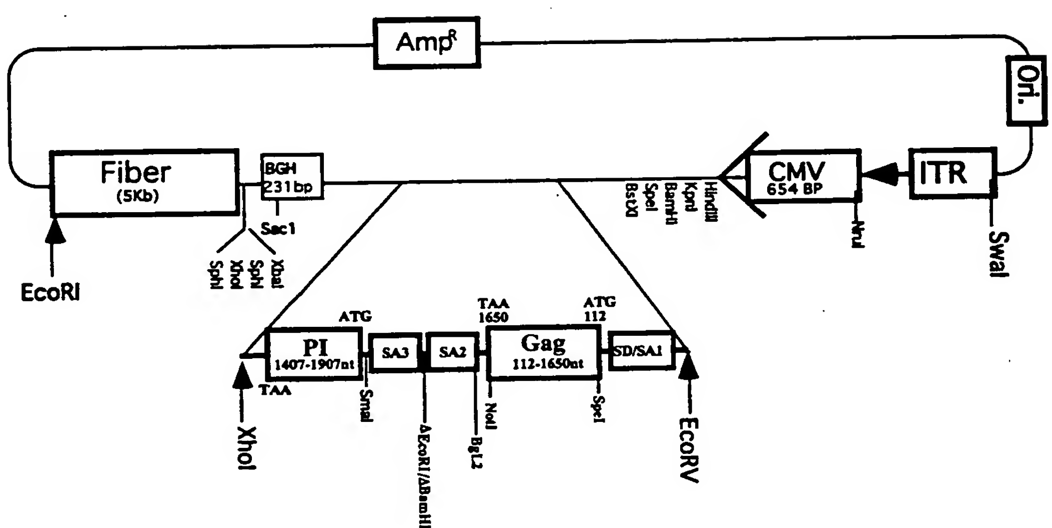


FIGURE 36

pRAd.ORF6-G-PI

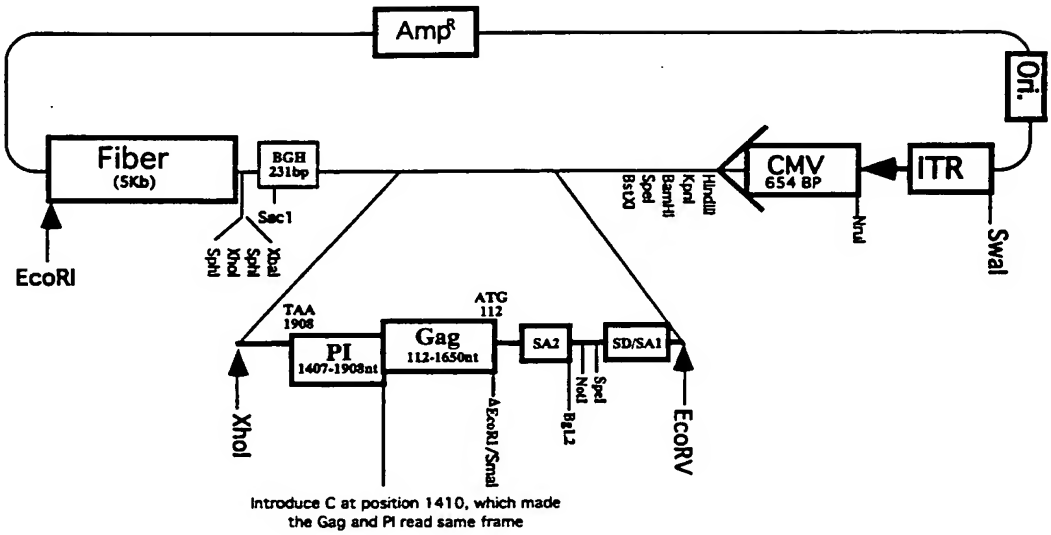


FIGURE 37

SD/SA1.2.3 vector

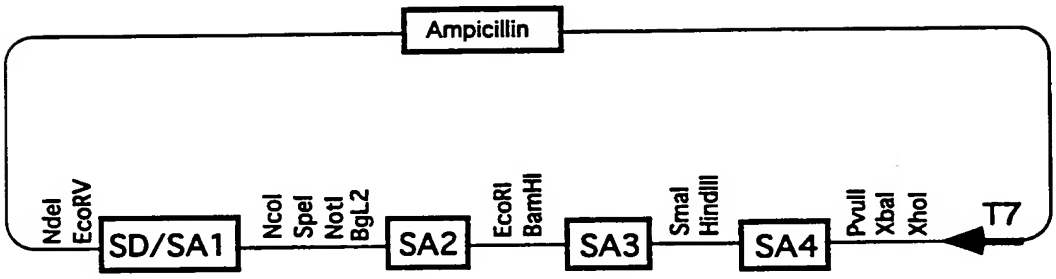


FIGURE 38

DNA Sequence of Env/Tat/Rev from BH10 clone [SEQ ID NO: 14]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacat
EcoRI
agcagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctgga
agcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgctttcattgccaa
gtttgtttcataacaaaagccttaggcatctcctatggcaggaagaagcggagacagcgacgaagacctcc
tcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagtacatgtaatgcaacctatacaaa
tagcaatagtagcattagtagtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatat
aggaaaatattaagacaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtgg
caatgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatggggcaccatgctccttggg
atgttgatgatctgtagtgctacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaagga
agcaaccaccactctattttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggcca
cacatgcctgtgtacccacagaccccaacccacaagaagtagtattggtaaatgtgacagaaaattttaac
atgtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcctaaagcc
atgtgtaaaattaaccccactctgtgttagtttaaagtgcactgatttgaagaatgatactaataccaata
gtagtagcgggagaatgataatggagaaaggagagataaaaaactgctctttcaatatcagcacaagcata
agaggtaaggtgcagaaagaatatgcatttttttataaacttgatataataccaatagataatgatactac
cagctatacgttgacaagttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaa
ttcccatacattattgtgccccggctggttttgcgattctaaaatgtaataataagacgttcaatggaaca
ggaccatgtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaactcaactgct
gttaaatggcagtctggcagaagaagaggtagtaattagatctgccaatttcacagacaatgctaaaacca
taatagtacagctgaaccaatctgtagaaattaattgtacaagacccaacaacaatacaagaaaaagtatc
cgtatccagagaggaccagggagagcatttgttacaataggaaaaataggaaatatgagacaagcacattg
taacattagtagagcaaaatggaataacactttaaaacagatagatagcaaattaagagaacaatttggaa
ataataaaacaataatctttaagcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgt
ggaggggaatttttctactgtaattcaacacaactgtttaatagtacttggtttaatagtacttggagta
ctaaagggtcaaataacactgaaggaagtgacacaatcaccctcccatgcagaataaaacaaattataaac
atgtggcaggaagtaggaaaagcaatgtatgccctcccatcagtggacaaattagatgttcatcaaatat
tacagggctgctattaacaagagatggtggtaatagcaacaatgagtccgagatcttcagacctggaggag
gagatatgagggacaattggagaagtgaattatataaatataaagtagtaaaaattgaaccattaggagta
gcacccaccaaggcaaagagaagagtggtgcagagagaaaaaagagcagtgggaataggagctttgttcct
tgggttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagacaat
tattgtctggtatagtgcagcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaa
ctcacagtctggggcatcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaaca
gctcctggggatttggggttgctctggaaaactcatttgcaccactgctgtgccttggaatgctagttgga
gtaataaatctctggaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattac
acaagcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattgga
attagataaatgggcaagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattca
taatgatagtaggaggcttggtaggtttaagaatagtttttgctgtactttctgtagtgaatagagttagg
cagggatattcaccattatcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaat
agaagaagaaggtggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatct
gggacgatctgcggagcctgtgcctcttcagctaccaccgcttgagagacttactcttgattgtaacgagg
attgtggaacttctgggacgcaggggtgggaagccctcaaatattggtggaatctcctacagtattggag
tcaggagctaaagaatagtgctgttagcttgctcaatgccacagctatagcagtagctgaggggacagata
gggttatagaagtagtacaaggagcttatagagctattcgccacatacctagaagaataagacagggcttg
gaaaggattttgctataagatgggtggcaagtggtcaaaaagtagtgtggttggatggcctgctgtaaggg
aaagaatgagacgagctgagccagcagcagatggggtgggagcagcatctcgag
XhoI

FIGURE 39

DNA Sequence of IL-2ΔX [SEQ ID NO: 15]:

Tcactctctttaatcactactcacagtaacctcaactcctgccacaatgta
caggatgcaactcctgtcttgcattgcactaagtcttgcacttgtcacaaa
cagtgcacctacttcaagttctacaaagaaaacacagctacaactggagca
tttactgctggatttacagatgattttgaatggaattaataattacaagaa
tcccaaactcaccaggatgctcacatttaagttttacatgcccaagaaggc
cacagaactgaaacatcttcagtgtct**t**gaagaagaactcaaacctctgga

ΔXbaI (cta → ctt)

ggaagtgctaaatttagctcaaagcaaaaactttcacttaagacccaggga
cttaatcagcaatatcaacgtaatagttctggaactaaagggatctgaaac
aacattcatgtgtgaatatgctgatgagacagcaaccattgtagaatttct
gaacagatggattacctttgtcaaagcatcatctcaacactaacttga

FIGURE 40

DNA Sequence of $Env^{m}\Delta C\Delta T^{300}$ (HIV strain BH10) [SEQ ID NO: 16]:

Gaattcgcca**ccatgg**gagtgaaggagaaatatcagcacttgtggagatg
EcoRI Kozak NcoI
ggggtggagatggggcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaa
ttgtgggtcacagtctattatggggtacctgtgtggaaggaagcaaccaccactctatttt
gtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccacacatgcctg
tgtacccacagaccccaacccacaagaagtagtattggtaaatgtgacagaaaatttaac
atgtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaa
gcctaaagccatgtgtaaaattaaccccactctgtgttagtttaaagtgcactgatttgaa
gaatgatactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaa
aactgctctttcaatatcagcacaagcataagaggtaaggtgcagaaagaatatgcatttt
tttataaacttgatataataccaatagataatgatactaccagctatacgttgacaagttg
taacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaattcccatacat
tattgtgccccggctggttttgcgattctaaaatgtaataataagacgttcaatggaacag
gaccatgtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaac
tcaactgctgttaaatggcagtctggcagaagaagaggtagtaattagatctgccaatttc
acagacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaattgtacaa
gacccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgt
tacaataggaaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaatgg
aataacactttaaaacagatagatagcaaattaagagaacaatttggaaataataaaacaa
taatctttaagcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgtgg
aggggaatttttctactgtaattcaacacaactgtttaatagtacttggtttaatagtact
tggagtactaaagggtcaaataacactgaaggaagtgacacaatcaccctcccatgcagaa
taaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgcccctcccatcag
tggacaaattagatgttcatcaaatattacagggctgctattaacaagagatggtggtaat
agcaacaatgagtccgagatcttcagacctggaggaggagatatgagggacaattggagaa
gtgaattatataaatataaagtagtaaaaattgaaccattaggagtagcacccaccaaggc
aaagagaagagtggtgcagACTAGTgcagtgggaataggagctt
ΔCleavage site(**agagaaaaaaga**)→SpeI
tgttccttgggttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgac
ggtacaggccagacaattattgtctggtatagtgcagcagcagaacaatttgctgagggct
attgaggcgcaacagcatctgttgcaactcacagtctggggcatcaagcagctccaggcaa
gaatcctggctgtggaaagatacctaaaggatcaacagctcctggggatttggggttgctc
tggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaatctctg
gaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacacaa
gcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaatt
attggaattagataaatgggcaagtttgtggaattggtttaacataacaaattggctgtgg
tatataaaattattcataatgatagtaggaggcttggtaggtttaagaatagttttgctg
tactttctgtagtgaatagagttaggcagggatattcaccattatcgtttcagacccacct
cccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggtggagagagagac
agagacagatccattcgattagtgaacggatccttagcacttatctggtaa

FIGURE 41A

DNA Sequence of Full length HIV-1 Gag [SEQ ID NO: 17]:

ggctagaaggagagaggatgggtgcgagagcgtcagtattaagcgggggag
aattagatcgatgggaaaaaattcggttaaggccagggggaaagaaaaaat
ataaattaaaacatatagtatgggcaagcagggagctagaacgactacaac
catcccttcagacaggatcagaagaacttagatcattatataatacagtag
caaccctctattgtgtgcatcaaaggatagagataaaagacaccaaggaag
ctttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagc
aagcagcagctgacacaggacacagcagtcaggtcagccaaaattacccta
tagtgcagaacatccaggggcaaatggtacatcaggccatatcacctagaa
ctttaaatgcatgggtaaaagtagtagaagagaaggctttcagcccagaag
taatacccatgttttcagcattatcagaaggagccaccccacaagatttaa
acaccatgctaaacacagtgggggacatcaagcagccatgcaaatgttaa
aagagaccatcaatgaggaagctgcagaatgggatagagtacatccagtgc
atgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgaca
tagcaggaactactagtacccttcaggaacaaataggatggatgacaaata
atccacctatcccagtaggagaaatttataaaagatggataatcctgggat
taaataaaatagtaagaatgtatagccctaccagcattctggacataagac
aaggaccaaaagaacctttagagactatgtagaccggttctataaaactc
taagagccgagcaagcttcacaggaggtaaaaaattggatgacagaaacct
tgttggtccaaaatgcgaacccagattgtaagactattttaaaagcattgg
gaccagcggctacactagaagaaatgatgacagcatgtcagggagtaggag
gacccggccataaggcaagagttttggctgaagcaatgagccaagtaacaa
atacagctaccataatgatgcagaggcaattttaggaaccaaagaaaga
tggttaagtgtttcaattgtggcaaagaagggcacacagccagaaattgca
gggcccctaggaaaaagggctgttggaaatgtggaaaggaaggacaccaaa
tgaaagattgtactgagagacaggctaatttttttagggaagatctggcctt
cctacaagggaaggccagggaatttcttcagagcagaccagagccaacag
ccccaccatttcttcagagcagaccagagccaacagccccaccagaagaga
gcttcaggtctggggtagagacaacaactccccctcagaagcaggagccga
tagacaaggaactgtatcctttaacttccctcagatcactctttggcaacg
acccctcgtcacaataa

FIGURE 41B

Amino Acid Sequence of HIV-1 (Strain BH10) Gag [SEQ ID NO: 18]:

M	G	A	R	A	S	V	L	S	G	G	E	L	D	R	W	E	K
I	R	L	R	P	G	G	K	K	K	Y	K	L	K	H	I	V	W
A	S	R	E	L	E	R	L	Q	P	S	L	Q	T	G	S	E	E
L	R	S	L	Y	N	T	V	A	T	L	Y	C	V	H	Q	R	I
E	I	K	D	T	K	E	A	L	D	K	I	E	E	E	Q	N	K
S	K	K	K	A	Q	Q	A	A	A	D	T	G	H	S	S	Q	V
S	Q	N	Y	P	I	V	Q	N	I	Q	G	Q	M	V	H	Q	A
I	S	P	R	T	L	N	A	W	V	K	V	V	E	E	K	A	F
S	P	E	V	I	P	M	F	S	A	L	S	E	G	A	T	P	Q
D	L	N	T	M	L	N	T	V	G	G	H	Q	A	A	M	Q	M
L	K	E	T	I	N	E	E	A	A	E	W	D	R	V	H	P	V
H	A	G	P	I	A	P	G	Q	M	R	E	P	R	G	S	D	I
A	G	T	T	S	T	L	Q	E	Q	I	G	W	M	T	N	N	P
P	I	P	V	G	E	I	Y	K	R	W	I	I	L	G	L	N	K
I	V	R	M	Y	S	P	T	S	I	L	D	I	R	Q	G	P	K
E	P	F	R	D	Y	V	D	R	F	Y	K	T	L	R	A	E	Q
A	S	Q	E	V	K	N	W	M	T	E	T	L	L	V	Q	N	A
N	P	D	C	K	T	I	L	K	A	L	G	P	A	A	T	L	E
E	M	M	T	A	C	Q	G	V	G	G	P	G	H	K	A	R	V
L	A	E	A	M	S	Q	V	T	N	T	A	T	I	M	M	Q	R
G	N	F	R	N	Q	R	K	M	V	K	C	F	N	C	G	K	E
G	H	T	A	R	N	C	R	A	P	R	K	K	G	C	W	K	C
G	K	E	G	H	Q	M	K	D	C	T	E	R	Q	A	N	F	L
G	K	I	W	P	S	Y	K	G	R	P	G	N	F	L	Q	S	R
P	E	P	T	A	P	P	F	L	Q	S	R	P	E	P	T	A	P
P	E	E	S	F	R	S	G	V	E	T	T	P	P	P	Q	K	Q
E	P	I	D	K	E	L	Y	P	L	T	S	L	R	S	L	F	G
N	D	P	S	S	Q	*											

FIGURE 42

DNA Sequence of $E^{m}\Delta C\Delta T^{99}$.T.R (HIV strain pNL4-3) [SEQ ID NO: 19]:

```
Gaattctgcaacaactgctgtttatccatttcagaattgggtgtcgacatag
EcoRI
cagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctggaagca
tccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgctttcattgccaagtttgt
ttcatgacaaaagccttaggcatctcctatggcaggaagaagcggagacagcgacgaagagctcatcagaaca
gtcagactcatcaagcttctctatcaaagcagtaagtagtacatgtaatgcaacctataatagtagcaatagt
agcattagtagtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatataggaaaatatta
agacaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtggcaatgagagtgaag
gagaagtatcagcacttgtggagatgggggtggaaatggggcaccatgctccttgggatattgatgatctgta
gtgctacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaaggaagcaaccaccactctatt
ttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccacacatgcctgtgtacccaca
gaccccaacccacaagaagtagtattggtaaatgtgacagaaaattttaacatgtggaaaaatgacatggtag
aacagatgcatgaggatataatcagtttatgggatcaaagcctaaagccatgtgtaaaattaaccccactctg
tgttagtttaaagtgcactgatttgaagaatgatactaataccaatagtagtagcgggagaatgataatggag
aaaggagagataaaaaactgctctttcaatatcagcacaagcataagagataaggtgcagaaagaatatgcat
tctttttataaacttgatatagtaccaatagataatacca
gctataggttgataagttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaattcc
catacattattgtgccccggctggttttgcgattctaaaatgtaataataagacgttcaatggaacaggacca
tgtacaaatgtcagcacagtacaatgtacacatggaatcaggccagtagtatcaactcaactgctgttaaatg
gcagtctagcagaagaagatgtagtaattagatctgccaatttcacagacaatgctaaaaccataatagtaca
gctgaacacatctgtagaaattaattgtacaagacccaacaacaatacaagaaaaagtatccgtatccagagg
ggaccagggagagcatttgttacaataggaaaaataggaaatatgagacaagcacattgtaacattagtagag
caaaatggaatgccactttaaaacagatagctagcaaattaagagaacaatttggaaataataaaacaataat
ctttaagcaatcctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaatttttctac
tgtaattcaacacaactgtttaatagtacttggtttaatagtacttggagtactgaagggtcaaataacactg
aaggaagtgacacaatcacactcccatgcagaataaaacaatttataaacatgtggcaggaagtaggaaaagc
aatgtatgcccctcccatcagtggacaaattagatgttcatcaaatattactgggctgctattaacaagagat
ggtggtaataacaacaatgggtccgagatcttcagacctggaggaggcgatatgagggacaattggagaagtg
aattatataaatataaagtagtaaaaattgaaccattaggagtagcacccaccaaggcaaagagaagagtggt
gcagACTAGTgcagtgggaataggagctttgttccttg
       ΔCleavage site(agagaaaaaaga)→SpeI
ggttcttgggagcagcaggaagcactatgggctgcacgtcaatgacgctgacggtacaggccagacaattatt
gtctgatatagtgcagcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaactcaca
gtctggggcatcaaacagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctgg
ggatttggggttgctctggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaatc
tctggaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacacaagcttaata
cactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagataaatggg
caagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattcataatgatagtaggagg
cttggtaggtttaagaatagtttttgctgtactttctatagtgaatagagttaggcagggatattcaccatta
tcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggtggagaga
gagacagagacagatccattcgattagtgaacggatccttagcacttatctgggacgatctgcggagcctgtg
cctcttcagctaccaccgcttgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcagg
gggtgggaagccctcaaatattggtggaatctcctacagtattggagtcaggaactaaagaatagtgctgtta
acttgctcaatgccacagccatagcagtagctgagtaa
```

FIGURE 43

DNA Sequence of $E^{m}\Delta V_{12}\Delta C\Delta T^{99}$.T.R (Strain pNL4-3) [SEQ ID NO: 20]:

<u>Gaattc</u>tgcaacaactgctgtttatccatttcagaattgggtgtcgacatag
EcoRI
Cagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctggaagca
tccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgctttcattgccaagtttgt
ttcatgacaaaagccttaggcatctcctatggcaggaagaagcggagacagcgacgaagagctcatcagaaca
gtcagactcatcaagcttctctatcaaagcagtaagtagtacatgtaatgcaacctataatagtagcaatagt
agcattagtagtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatataggaaaatatta
agacaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtggca<u>atg</u>agagtgaag
gagaagtatcagcacttgtggagatgggggtggaaatggggcaccatgctccttgggatattgatgatctgta
gtgctacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaaggaagcaaccaccactctatt
ttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccacacatgcctgtgtacccaca
gaccccaacccacaagaagtagtattggtaaatgtgacagaaaattttaacatgtggaaaaatgacatggtag
aacagatgcatgaggatataatcagtttatgggatcaaagcctaaagccatgtgtaaaattaaccccactctg
tgtt **<u>ΔV1 and V2 loops</u>**
Agttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaattcccatacattattgtg
ccccggctggttttgcgattctaaaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtcag
cacagtacaatgtacacatggaatcaggccagtagtatcaactcaactgctgttaaatggcagtctagcagaa
gaagatgtagtaattagatctgccaatttcacagacaatgctaaaaccataatagtacagctgaacacatctg
tagaaattaattgtacaagacccaacaacaatacaagaaaaagtatccgtatccagaggggaccagggagagc
atttgttacaataggaaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaatggaatgcc
actttaaaacagatagctagcaaattaagagaacaatttggaaataataaaacaataatctttaagcaatcct
caggaggggacccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgtaattcaacaca
actgtttaatagtacttggtttaatagtacttggagtactgaagggtcaaataacactgaaggaagtgacaca
atcacactcccatgcagaataaaacaatttataaacatgtggcaggaagtaggaaaagcaatgtatgcccctc
ccatcagtggacaaattagatgttcatcaaatattactgggctgctattaacaagagatggtggtaataacaa
caatgggtccgagatcttcagacctggaggaggcgatatgagggacaattggagaagtgaattatataaatat
aaagtagtaaaaattgaaccattaggagtagcacccaccaaggcaaagagaagagtggtgcag**ACTAGT**gcag
tgggaataggagctttgttccttgggttcttgggagca
ΔCleavage site(**agagaaaaaaga**)→SpeI
gcaggaagcactatgggctgcacgtcaatgacgctgacggtacaggccagacaattattgtctgatatagtgc
agcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaactcacagtctggggcatcaa
acagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctggggatttggggttgc
tctggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaatctctggaacagattt
ggaataacatgacctggatggagtgggacagagaaattaacaattacacaagcttaatacactccttaattga
agaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagataaatggcaagtttgtggaat
tggtttaacataacaaattggctgtggtatataaaattattcataatgatagtaggaggcttggtaggtttaa
gaatagtttttgctgtactttctatagtgaatagagttaggcagggatattcaccattatcgtttcagaccca
cctcccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggtggagagagagacagagacaga
tccattcgattagtgaacggatccttagcacttatctgggacgatctgcggagcctgtgcctcttcagctacc
accgcttgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcagggggtgggaagccct
caaatattggtggaatctcctacagtattggagtcaggaactaaagaatagtgctgttaacttgctcaatgcc
acagccatagcagtagctgag<u>taa</u>

FIGURE 44

DNA Sequence of Env^{m}ΔC.T.R.N (Strain BH10) [SEQ ID NO: 21]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacat
EcoRI
agcagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctgga
agcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgctttcattgccaa
gtttgtttcataacaaaagccttaggcatctcctatggcaggaagaagcggagacagcgacgaagacctcc
tcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagtacatgtaatgcaacctatacaaa
tagcaatagtagcattagtagtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatat
aggaaaatattaagacaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtgg
caatgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatggggcaccatgctccttggg
atgttgatgatctgtagtgctacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaagga
agcaaccaccactctattttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggcca
cacatgcctgtgtacccacagaccccaacccacaagaagtagtattggtaaatgtgacagaaaattttaac
atgtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcctaaagcc
atgtgtaaaattaaccccactctgtgttagtttaaagtgcactgatttgaagaatgatactaataccaata
gtagtagcgggagaatgataatggagaaaggagagataaaaaactgctctttcaatatcagcacaagcata
agaggtaaggtgcagaaagaatatgcatttttttataaacttgatataataccaatagataatgatactac
cagctatacgttgacaagttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaa
ttcccatacattattgtgccccggctggttttgcgattctaaaatgtaataataagacgttcaatggaaca
ggaccatgtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaactcaactgct
gttaaatggcagtctggcagaagaagaggtagtaattagatctgccaatttcacagacaatgctaaaacca
taatagtacagctgaaccaatctgtagaaattaattgtacaagacccaacaacaatacaagaaaaagtatc
cgtatccagagaggaccagggagagcatttgttacaataggaaaaatagaaatatgagacaagcacattg
taacattagtagagcaaaatggaataacactttaaaacagatagatagcaaattaagagaacaatttggaa
ataataaaacaataatctttaagcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgt
ggaggggaatttttctactgtaattcaacacaactgtttaatagtacttggtttaatagtacttggagtac
taaagggtcaaataacactgaaggaagtgacacaatcaccctcccatgcagaataaaacaaattataaaca
tgtggcaggaagtaggaaaagcaatgtatgcccctcccatcagtggacaaattagatgttcatcaaatatt
acagggctgctattaacaagagatggtggtaatagcaacaatgagtccgagatcttcagacctggaggagg
agatatgagggacaattggagaagtgaattatataaatataaagtagtaaaaattgaaccattaggagtag
cacccaccaaggcaaagagaagagtggtgcagACTAGTgcagtgggaataggagctttgttccttgggttc
t
ΔCleavage site (**agagaaaaaaga**)→SpeI
tgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagacaattattgtct
ggtatagtgcagcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaactcacagt
ctggggcatcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctgg
ggatttggggttgctctggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaa
tctctggaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacacaagctt
aatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagata
aatgggcaagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattcataatgata
gtaggaggcttggtaggtttaagaatagttttgctgtactttctgtagtgaatagagttaggcagggata
ttcaccattatcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaag
aaggtggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctgggacgat
ctgcggagcctgtgcctcttcagctaccaccgcttgagagacttactcttgattgtaacgaggattgtgga
acttctgggacgcaggggtgggaagccctcaaatattggtggaatctcctacagtattggagtcaggagc
taaagaatagtgctgttagcttgctcaatgccacagctatagcagtagctgaggggacagatagggttata
gaagtagtacaaggagcttatagagctattcgccacatacctagaagaataagacagggcttggaaaggat
tttgctataagatgggtggcaagtggtcaaaaagtagtgtggttggatggcctgctgtaagggaaagaatg
agacgagctgagccagcagcagatggggtgggagcagcatctcgagacctagaaaaacatggagcaatcac
aagtagcaacacagcagctaacaatgctgattgtgcctggctagaagcacaagaggaggaggaggtgggtt
ttccagtcacacctcaggtacctttaagaccaatgacttacaaggcagctgtagatcttagccactttttta
aaagaaaaggggggactggaagggctaattcactcccaacgaagacaagatatccttgatctgtggatcta
ccacacacaaggctacttccctgattag

FIGURE 45

DNA Sequence of $E^m\Delta C.N$ (Strain BH10) [SEQ ID NO: 22]:

Gaattcgccaccatgggagtgaaggagaaatatcagcacttgtggagatgg
EcoRI Kozak NcoI
gggtggagatggggcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaattgtgggtcac
agtctattatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgctaaagcat
atgatacagaggtacataatgtttgggccacacatgcctgtgtacccacagaccccaacccacaagaagta
gtattggtaaatgtgacagaaaattttaacatgtggaaaaatgacatggtagaacagatgcatgaggatat
aatcagtttatgggatcaaagcctaaagccatgtgtaaaattaaccccactctgtgttagtttaaagtgca
ctgatttgaagaatgatactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaa
aactgctctttcaatatcagcacaagcataagaggtaaggtgcagaaagaatatgcatttttttataaact
tgatataataccaatagataatgatactaccagctatacgttgacaagttgtaacacctcagtcattacac
aggcctgtccaaaggtatcctttgagccaattcccatacattattgtgccccggctggttttgcgattcta
aaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtacaatgtacacatgg
aattaggccagtagtatcaactcaactgctgttaaatggcagtctggcagaagaagaggtagtaattagat
ctgccaatttcacagacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaattgtaca
agacccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaatagg
aaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaatggaataacactttaaaacaga
tagatagcaaattaagagaacaatttggaaataataaaacaataatctttaagcagtcctcaggaggggac
ccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgtaattcaacacaactgtttaa
tagtacttggtttaatagtacttggagtactaaagggtcaaataacactgaaggaagtgacacaatcaccc
tcccatgcagaataaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgcccctcccatc
agtggacaaattagatgttcatcaaatattacagggctgctattaacaagagatggtggtaatagcaacaa
tgagtccgagatcttcagacctggaggaggagatatgagggacaattggagaagtgaattatataaatata
aagtagtaaaaattgaaccattaggagtagcacccaccaaggcaaagagaagagtggtgcag**ACTAGT**gca
gtgggaataggagctttgttccttgggttcttgggagc

ΔCleavage site(**agagaaaaaaga**)→SpeI

agcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagacaattattgtctggtatag
tgcagcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaactcacagtctggggc
atcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctggggatttg
gggttgctctggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaatctctgg
aacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacacaagcttaatacac
tccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagataaatgggc
aagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattcataatgatagtaggag
gcttggtaggtttaagaatagtttttgctgtactttctgtagtgaatagagttaggcagggatattcacca
ttatcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggtgg
agagagagacagagacagatccattcgattagtgaacggatccttagcacttatctgggacgatctgcgga
gcctgtgcctcttcagctaccaccgcttgagagacttactcttgattgtaacgaggattgtggaacttctg
ggacgcaggggtgggaagccctcaaatattggtggaatctcctacagtattggagtcaggagctaaagaa
tagtgctgttagcttgctcaatgccacagctatagcagtagctgaggggacagatagggttatagaagtag
tacaaggagcttatagagctattcgccacatacctagaagaataagacagggcttggaaaggattttgcta
taagatgggtggcaagtggtcaaaaagtagtgtggttggatggcctgctgtaagggaaagaatgagacgag
ctgagccagcagcagatggggtgggagcagcatctcgagacctagaaaaacatggagcaatcacaagtagc
aacacagcagctaacaatgctgattgtgcctggctagaagcacaagaggaggaggaggtgggttttccagt
cacacctcaggtacctttaagaccaatgacttacaaggcagctgtagatcttagccactttttaaaagaaa
aggggggactggaagggctaattcactcccaacgaagacaagatatccttgatctgtggatctaccacaca
caaggctacttccctgattag

FIGURE 46

DNA Sequence of $E^{m}\Delta C\Delta T^{300}$.T (BH10) [SEQ ID NO: 23]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacat
EcoRI
Agcagaataggcgttactcgacagaggagagcaagaa**atg**gagccagtaga
Tat 1
tcctagactagagccctggaagcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaa
agtgttgctttcattgccaagtttgtttcataacaaaagccttaggcatctcctatggcaggaagaagcgg
agacagcgacgaagacctcctcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagtaca
tgtaatgcaacctatacaaatagcaatagtagcattagtagtagcaataataatagcaatagttgtgtggt
ccatagtaatcatagaatataggaaaatattaagacaaagaaaaatagacaggttaattgatagactaata
gaaagagcagaagacagtggca**atg**agagtgaaggagaaatatcagcacttgtggagatgggggtggagat
ggggcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaattgtgggtcacagtctattat
ggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgctaaagcatatgatacaga
ggtacataatgtttgggccacacatgcctgtgtacccacagaccccaacccacaagaagtagtattggtaa
atgtgacagaaaattttaacatgtggaaaaatgacatggtagaacagatgcatgaggatataatcagttta
tgggatcaaagcctaaagccatgtgtaaaattaaccccactctgtgttagtttaaagtgcactgatttgaa
gaatgatactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaaaactgctctt
tcaatatcagcacaagcataagaggtaaggtgcagaaagaatatgcatttttttataaacttgatataata
ccaatagataatgatactaccagctatacgttgacaagttgtaacacctcagtcattacacaggcctgtcc
aaaggtatcctttgagccaattcccatacattattgtgccccggctggttttgcgattctaaaatgtaata
ataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtacaatgtacacatggaattaggcca
gtagtatcaactcaactgctgttaaatggcagtctggcagaagaagaggtagtaattagatctgccaattt
cacagacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaattgtacaagacccaaca
acaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaataggaaaaatagga
aatatgagacaagcacattgtaacattagtagagcaaaatggaataacactttaaaacagatagatagcaa
attaagagaacaatttggaaataataaaacaataatctttaagcagtcctcaggaggggacccagaaattg
taacgcacagttttaattgtggaggggaatttttctactgtaattcaacacaactgtttaatagtacttgg
tttaatagtacttggagtactaaagggtcaaataacactgaaggaagtgacacaatcaccctcccatgcag
aataaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgcccctcccatcagtggacaaa
ttagatgttcatcaaatattacagggctgctattaacaagagatggtggtaatagcaacaatgagtccgag
atcttcagacctggaggaggagatatgagggacaattggagaagtgaattatataaatataaagtagtaaa
aattgaaccattaggagtagcacccaccaaggcaaagagaagagtggtgcag**ACTAGT**gcagtgggaatag
gagctttgttccttgggttc
ΔCleavage site(**agagaaaaaaga**)→SpeI
ttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagacaattattgtc
tggtatagtgcagcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaactcacag
tctggggcatcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctg
gggatttggggttgctctggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataa
atctctggaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacacaagct
taatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagat
aaatgggcaagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattcataatgat
agtaggaggcttggtaggtttaagaatagtttttgctgtactttctgtagtgaatagagttaggcagggat
attcaccattatcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaa
gaaggtggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctggtaa

Figure 47

DNA Sequence of E^m/E^m (BH10) [SEQ ID NO: 24]:

```
Gaattcgccaccatgggagtgaaggagaaatatcagcacttgtggagatgg
EcoRI  Kozak  NcoI
gggtggagatggggcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaattgtgggtcac
agtctattatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgctaaagcat
atgatacagaggtacataatgtttgggccacacatgcctgtgtacccacagaccccaacccacaagaagta
gtattggtaaatgtgacagaaaattttaacatgtggaaaaatgacatggtagaacagatgcatgaggatat
aatcagtttatgggatcaaagcctaaagccatgtgtaaaattaaccccactctgtgttagtttaaagtgca
ctgatttgaagaatgatactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaa
aactgctctttcaatatcagcacaagcataagaggtaaggtgcagaaagaatatgcatttttttataaact
tgatataataccaatagataatgatactaccagctatacgttgacaagttgtaacacctcagtcattacac
aggcctgtccaaaggtatcctttgagccaattcccatacattattgtgccccggctggttttgcgattcta
aaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtacaatgtacacatgg
aattaggccagtagtatcaactcaactgctgttaaatggcagtctggcagaagaagaggtagtaattagat
ctgccaatttcacagacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaattgtaca
agacccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaatagg
aaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaatggaataacactttaaaacaga
tagatagcaaattaagagaacaatttggaaataataaaacaataatctttaagcagtcctcaggaggggac
ccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgtaattcaacacaactgtttaa
tagtacttggtttaatagtacttggagtactaaagggtcaaataacactgaaggaagtgacacaatcaccc
tcccatgcagaataaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgcccctcccatc
agtggacaaattagatgttcatcaaatattacagggctgctattaacaagagatggtggtaatagcaacaa
tgagtccgagatcttcagacctggaggaggagatatgagggacaattggagaagtgaattatataaatata
aagtagtaaaaattgaaccattaggagtagcacccaccaaggcaaagagaagagtggtgcagagagaaaaa
agagcagtgggaataggagctttgttccttgggttcttgggagcagcaggaagcactatgggcgcagcgtc
aatgacgctgacggtacaggccagacaattattgtctggtatagtgcagcagcagaacaatttgctgaggg
ctattgaggcgcaacagcatctgttgcaactcacagtctggggcatcaagcagctccaggcaagaatcctg
gctgtggaaagatacctaaaggatcaacagctcctggggatttggggttgctctggaaaactcatttgcac
cactgctgtgccttggaatgctagttggagtaataaatctctggaacagatttggaataacatgacctgga
tggagtgggacagagaaattaacaattacacaagcttaatacactccttaattgaagaatcgcaaaaccag
caagaaaagaatgaacaagaattattggaattagataaatgggcaagtttgtggaattggtttaacataac
aaattggctgtggtatataaaattattcataatgatagtaggaggcttggtaggtttaagaatagtttttg
ctgtactttctgtagtgaatagagttaggcagggatattcaccattatcgtttcagacccacctcccaatc
ccgaggggacccgacaggcccgaaggaatagaagaagaaggtggagagagagacagagacagatccattcg
attagtgaacggatccttagcacttatctgggacgatctgcggagcctgtgcctcttcagctaccaccgct
tgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcagggggtgggaagccctcaaa
tattggtggaatctcctacagtattggagtcaggagctaaagaatagtgctgttagcttgctcaatgccac
agctatagcagtagctgaggggacagatagggttatagaagtagtacaaggagcttatagagctattcgcc
acatacctagaagaataagacagggcttggaaaggattttgctataa
```

FIGURE 48

Sequences of V3 loop Multi-clade HIV-1 Clones:

Clade	ACC#	HIV-1 Strain	From(nt)	To(nt)
B	M15654	BH10	885	992
A	U09127	192UG037WHO.01083hED	888	992
C	U09126	192BR025WHO.01093hED	876	980
D	U43386	192UG024.2	888	989
E	U08458	193TH976.17	894	998
F	U27401	193BR020.17	888	992
G	U30312	192RU131.9	885	989

Tgtacaagacccaacaacaatacaagaaaaagtatccgtatccagagagga
ccagggagagcatttgttacaataggaaaaataggaaatatgagacaagca
cattgt **Clade B [SEQ ID NO: 25]**

Tgtaccagacctaacaacaatacaagaaaaagtgtacgtataggaccagga
caaacattctatgcaacaggtgatataataggggatataagacaagcacat
tgt **Clade A [SEQ ID NO: 26]**

Tgtacgagacccaacaataatacaagaaaaagtataaggataggaccagga
caagcattctatgcaacaggagaaataataggagatataagacaagcacat
tgt **Clade C [SEQ ID NO: 27]**

Tgcacaaggccctacaacaatataagacaaaggacccccataggactaggg
caagcactctatacaacaagaagaatagaagatataagaagagcacattgt
Clade D [SEQ ID NO: 28]

Tgtaccagaccctccaccaatacaagaacaagtatacgtataggaccagga
caagtattctatagaacaggagacataacaggagatataagaaaagcatat
tgt **Clade E [SEQ ID NO: 29]**

Tgtacaagacccaacaacaatacaagaaaaagaatatctttaggaccagga
cgagtattttatacagcaggagaaataataggagacatcagaaaggcacat
tgt **Clade F [SEQ ID NO: 30]**

Tgtaccagacctaataacaatacaagaaaaagtataacttttgcaccagga
caagcgctctatgcaacaggtgaaataataggagatataagacaagcacat
tgt **Clade G [SEQ ID NO: 31]**

FIGURE 49A

DNA sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 32]:

Atgagagtgaaggagaaatatcagcacttgtggagatggggtggagatggggcaccatgctccttgggat
gttgatgatctgtagtgctacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaaggaag
caaccaccactctattttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccaca
catgcctgtgtacccacagaccccaacccacaagaagtagtattggtaaatgtgacagaaaatttttaacat
gtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcctaaagccat
gtgtaaaattaaccccactctgtgttggagctggtagttgtaacacctcagt
V1, V2 deletion, GAG insertion
Cattacacaggcctgtccaaaggtatcctttgagccaattcccatacattattgtgccccggctggttttg
cgattctaaaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtacaatgt
acacatggaattaggccagtagtatcaactcaactgctgttaaatggcagtctggcagaagaagaggtagt
aattagatctgccaatttcacagacaatgctaaaaccataatagtacagctgaaccaatctgtagaaatta
attgtacaagacccaacaacaa
Start of Clade B
Tacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaataggaaaaataggaaata
tgagacaagcacattgtctcgggtgtaccag
Insert a AvaI site Clade A
Acctaacaacaatacaagaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataa
taggggatataagacaagcacattgttgtac
Clade C
Gagacccaacaataatacaagaaaaagtataaggataggaccaggacaagcattctatgcaacaggagaaa
taataggagatataagacaagcacattgttg
Clade D
Cacaaggccctacaacaatataagacaaaggacccccataggactagggcaagcactctatacaacaagaa
gaatagaagatataagaagagcacattgttg
Clade E
Taccagaccctccaccaatacaagaacaagtatacgtataggaccaggacaagtattctatagaacaggag
acataacaggagatataagaaaagcatattgtggatcctgtacaagacccaacaacaatacaagaaaaaga
atatctttagg
BamHI clade F
Accaggacgagtattttatacagcaggagaaataataggagacatcagaaaggcacattgttgtaccagac
ctaataacaatacaagaaaaagtataacttt
Clade G
Tgcaccaggacaagcgctctatgcaacaggtgaaataataggagatataagacaagcacattgtctcggga
acattagtagagcaaaatggaataacactt
Insert a AvaI
Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatctttaagcagtcctcag
gaggggacccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgtaattcaacacaa
ctgtttaatagtacttggtttaatagtacttggagtactaaagggtcaaataacactgaaggaagtgacac
aatcaccctcccatgcagaataaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgccc
ctcccatcagtggacaaattagatgttcatcaaatattacagggctgctattaacaagagatggtggtaat
agcaacaatgagtccgagatcttcagacctggaggaggagatatgagggacaattggagaagtgaattata
taaatataaagtagtaaaaattgaaccattaggagtagcacccaccaaggcaaagagaagagtggtgcaga
ctagtgcagtggg
Cleavage site mutation (SpeI)
Aataggagctttgttccttgggttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctga
cggtacaggccagacaattattgtctggtatagtgcagcagcagaacaatttgctgagggctattgaggcg
caacagcatctgttgcaactcacagtctggggcatcaagcagctccaggcaagaatcctggctgtggaaag
atacctaaaggatcaacagctcctggggatttggggttgctctggaaaactcatttgcaccactgctgtgc
cttggaatgctagttggagtaataaatctctggaacagatttggaataacatgacctggatggagtgggac
agagaaattaacaattacacaagcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaa
tgaacaagaattattggaattagataaatgggcaagtttgtggaattggtttaacataacaaattggctgt
ggtatataaaatcgtggctgctgctgctcctgctctccctctccctcctccaggccacggatttcatgtcc
ctgtga GPI anchor

FIGURE 49B

Amino acid sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 33]:

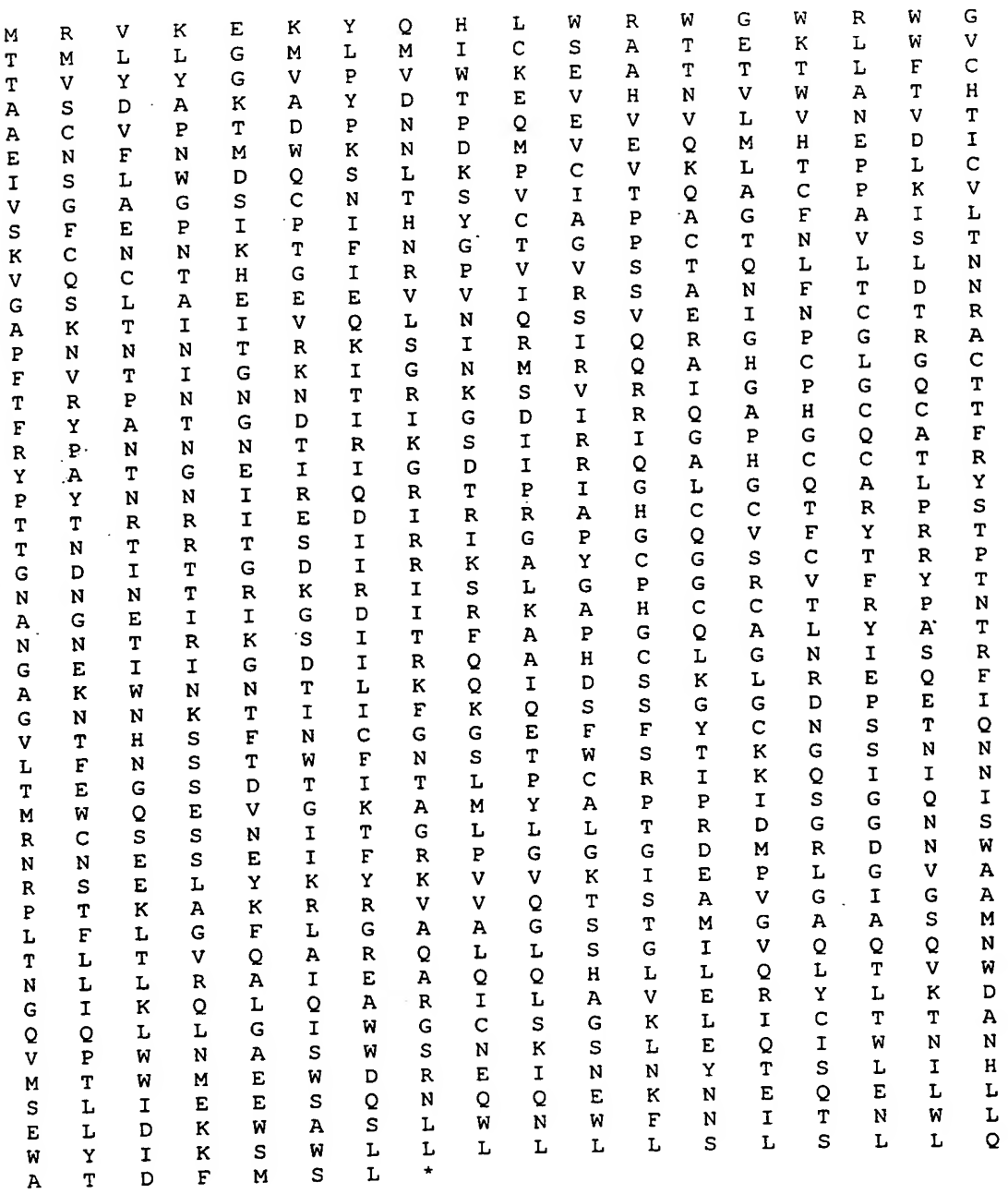


FIGURE 50A

1. DNA sequence of p17/24 in natural form [SEQ ID NO: 34]:

atgggtgcgagagcgtcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccagg
gggaaagaaaaaatataaattaaaacatatagtatgggcaagcagggagctagaacgattcgcagttaatc
ctggcctgttagaaacatcagaaggctgtagacaaatactgggacagctacaaccatcccttcagacagga
tcagaagaacttagatcattatataatacagtagcaaccctctattgtgtgcatcaaaggatagagataaa
agacaccaaggaagctttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcag
cagctgacacaggacacagcagtcaggtcagccaaaattaccctatagtgcagaacatccaggggcaaatg
gtacatcaggccatatcacctagaactttaaatgcatgggtaaaagtagtagaagagaaggctttcagccc
agaagtaatacccatgttttcagcattatcagaaggagccaccccacaagatttaaacaccatgctaaaca
cagtgggggacatcaagcagccatgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggat
agagtacatccagtgcatgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgacatagc
aggaactactagtacccttcaggaacaaataggatggatgacaaataatccacctatcccagtaggagaaa
tttataaaagatggataatcctgggattaaataaaatagtaagaatgtatagccctaccagcattctggac
ataagacaaggaccaaaagaacctttagagactatgtagaccggttctataaaactctaagagccgagca
agcttcacaggaggtaaaaaattggatgacagaaaccttgttggtccaaaatgcgaacccagattgtaaga
ctattttaaaagcattgggaccagcggctacactagaagaaatgatgacagcatgtcagggagtaggagga
cccggccataaggcaagagttttgtaa

2. DNA sequence of p17/24 in secreted form [SEQ ID NO: 35]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
ggcaccatgctccttgggatgttgatgatctgtagtgctggtgcgagagcg
p17/p24
tcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccaggggaaagaaaaaata
taaattaaaacatatagtatgggcaagcagggagctagaacgattcgcagttaatcctggcctgttagaaa
catcagaaggctgtagacaaatactgggacagctacaaccatcccttcagacaggatcagaagaacttaga
tcattatataatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagc
tttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacaggac
acagcagtcaggtcagccaaaattaccctatagtgcagaacatccaggggcaaatggtacatcaggccata
tcacctagaactttaaatgcatgggtaaaagtagtagaagagaaggctttcagcccagaagtaatacccat
gttttcagcattatcagaaggagccaccccacaagatttaaacaccatgctaaacacagtgggggacatc
aagcagccatgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggatagagtacatccagtg
catgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgacatagcaggaactactagtac
ccttcaggaacaaataggatggatgacaaataatccacctatcccagtaggagaaatttataaaagatgga
taatcctgggattaaataaaatagtaagaatgtatagccctaccagcattctggacataagacaaggacca
aaagaacctttagagactatgtagaccggttctataaaactctaagagccgagcaagcttcacaggaggt
aaaaaattggatgacagaaaccttgttggtccaaaatgcgaacccagattgtaagactattttaaaagcat
tgggaccagcggctacactagaagaaatgatgacagcatgtcagggagtaggaggacccggccataaggca
agagttttgtaa

FIGURE 50A -continued

1. DNA sequence of p17/24 in membrane form [SEQ ID NO: 36]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
Ggcaccatgctccttgggatgttgatgatctgtagtgctggtgcgagagcg
P17/p24

tcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccagggggaaagaaaaaata
taaattaaaacatatagtatgggcaagcagggagctagaacgattcgcagttaatcctggcctgttagaaa
catcagaaggctgtagacaaatactgggacagctacaaccatcccttcagacaggatcagaagaacttaga
tcattatataatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagc
tttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacaggac
acagcagtcaggtcagccaaaattaccctatagtgcagaacatccaggggcaaatggtacatcaggccata
tcacctagaactttaaatgcatgggtaaaagtagtagaagagaaggctttcagcccagaagtaatacccat
gttttcagcattatcagaaggagccaccccacaagatttaaacaccatgctaaacacagtgggggacatc
aagcagccatgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggatagagtacatccagtg
catgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgacatagcaggaactactagtac
ccttcaggaacaaataggatggatgacaaataatccacctatcccagtaggagaaatttataaaagatgga
taatcctgggattaaataaaatagtaagaatgtatagccctaccagcattctggacataagacaaggacca
aaagaacctttagagactatgtagaccggttctataaaactctaagagccgagcaagcttcacaggaggt
aaaaaattggatgacagaaaccttgttggtccaaaatgcgaacccagattgtaagactattttaaaagcat
tgggaccagcggctacactagaagaaatgatgacagcatgtcagggagtaggaggacccggccataaggca
agagttttg
ttattcataatgatagtaggaggcttggtaggtttaagaatagtttttgctgtactttctgtagtgaatag
agttaggcagggatattcaccattatcgtttcagacccacctcccaatcccgaggggataa
gp41 transmembrane domain

FIGURE 50B

1. Amino acid sequence of p17/24 in natural form [SEQ ID NO: 37]:

M I A E E R N Q Q A P Q P D N N P E N L R
G R S G E I K V A F Q M V I P K K Q A E V
A L R C L E S S I S D L H A P I E A N E L
R R E R R I K Q S P L K A G I V P S P M *
A P L Q S K K N P E N E G T P R F Q D M
S G E I L D K Y R V T T P T V M R E C T
V G R L Y T A P T I M I I S G Y D V K A
L K F G N K Q I L P L N A T E S Y K T C
S K A Q T E Q V N M N E P L I P V N I Q
G K V L V A A Q A F T E G Q Y T D W L G
G Y N Q A L A N W S V A Q E K S R M K V
E K P P T D A I V A G A M Q R I F T A G
L L G S L K D Q K L G E R I W L Y E L G
D K L L Y I T G V S H W E G I D K T G P
R H L Q C E G Q V E Q D P W I I T L P G
W I E T V E H M E G A R R M L R L L A H
E V T G H E S V E A A V G T G Q R V A K
K W S S Q Q S H K T M H S N L G A Q T A

2. Amino acid sequence of p17/24 in secreted form [SEQ ID NO: 38]:

M T L K F G N K Q Q Q I L P L N A T E S Y T C
R M S K A Q T E Q Q Q V N M N E P L I P V I Q
V L G K V L V A A A A Q A F T E G Q Y T D L G
K L G Y N Q A L A A A N W S V A Q E K S R K V
E G E K P P T D A A A I V A G A M Q R I F A G
K M L L G S L K D D D Q K L G E R I W L Y L G
Y L D K L L Y I T T T G V S H W E G I D K G P
Q M R H L Q C E G G G Q V E Q D P W I I T P G
H I W I E T V E H H H M E G A R R M L R L A H
L C E V T G H E S S S V E A A V G T G Q R A K
W S K W S S Q Q S S S H K T M H S N L G A T A
R A I A E E R N Q Q Q Q A P Q P D N N P E L R
W G R S G E I K V V V A F Q M V I P K K Q E V
G A L R C L E S S S S I S D L H A P I E A E L
W R R E R R I K Q Q Q S P L K A G I V P S M *
R A P L Q S K K N N N P E N E G T P R F Q M
W S G E I L D K Y Y Y R V T T P T V M R E T
G V G R L Y T A P P P T I M I I S G Y D V A

FIGURE 50B-continued

1. Amino acid sequence of p17/24 in membrane bound form [SEQ ID NO: 39]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	G	A	R	A	S	V
L	S	G	G	E	L	D	R	W	E	K	I	R	L	R	P	G	G
L	S	G	G	E	L	D	R	W	E	K	I	R	L	R	P	G	G
K	K	K	Y	K	L	K	H	I	V	W	A	S	R	E	L	E	R
F	A	V	N	P	G	L	L	E	T	S	E	G	C	R	Q	I	L
G	Q	L	Q	P	S	L	Q	T	G	S	E	E	L	R	S	L	Y
N	T	V	A	T	L	Y	C	V	H	Q	R	I	E	I	K	D	T
K	E	A	L	D	K	I	E	E	E	Q	N	K	S	K	K	K	A
Q	Q	A	A	A	D	T	G	H	S	S	Q	V	S	Q	N	Y	P
I	V	Q	N	I	Q	G	Q	M	V	H	Q	A	I	S	P	R	T
L	N	A	W	V	K	V	V	E	E	K	A	F	S	P	E	V	I
P	M	F	S	A	L	S	E	G	A	T	P	Q	D	L	N	T	M
L	N	T	V	G	G	H	Q	A	A	M	Q	M	L	K	E	T	I
N	E	E	A	A	E	W	D	R	V	H	P	V	H	A	G	P	I
A	P	G	Q	M	R	E	Q	R	R	S	D	I	A	G	T	T	S
T	L	Q	E	Q	I	R	P	M	G	N	N	P	P	I	P	V	G
E	I	Y	K	R	F	W	D	L	T	L	N	K	I	V	R	M	Y
S	P	T	S	M	T	L	I	R	Q	G	P	K	E	P	F	R	D
Y	V	D	R	K	A	Y	K	L	R	A	E	Q	A	S	Q	E	V
K	N	W	M	V	G	E	T	L	V	Q	N	A	N	P	D	C	K
T	I	L	K	A	I	L	G	A	K	T	L	E	E	M	M	T	A
C	Q	G	V	G	F	G	P	H	I	A	R	V	L	L	F	I	M
I	V	G	R	L	T	V	G	R	L	V	F	A	V	L	S	V	V
N	R	V	*	Q	A	G	Y	P	L	S	F	Q	T	H	L	P	I
P	R	G			G	S	G										

FIGURE 51A

1. DNA sequence of p17 in natural form [SEQ ID NO: 40]:

atgggtgcgagagcgtcagtattaagcgggggagaattagatcgatgggaaaaaattcg
gttaaggccaggggaaagaaaaatataaattaaaacatatagtatgggcaagcaggg
agctagaacgattcgcagttaatcctggcctgttagaaacatcagaaggctgtagacaa
atactgggacagctacaaccatcccttcagacaggatcagaagaacttagatcattata
taatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaagg
aagctttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagca
gcagctgacacaggacacagcagtcaggtcagccaaaattactaa

2. DNA sequence of p17 in secreted form [SEQ ID NO: 41]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
ggcaccatgctccttgggatgttgatgatctgtagtgct**ggt**gcgagagcg
p17
tcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccagggg
aaagaaaaaatataaattaaaacatatagtatgggcaagcagggagctagaacgattcg
cagttaatcctggcctgttagaaacatcagaaggctgtagacaaatactgggacagcta
caaccatcccttcagacaggatcagaagaacttagatcattatataatacagtagcaac
cctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagctttagacaaga
tagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacagga
cacagcagtcaggtcagccaaaattactaa

3. DNA sequence of p17 in membrane bound form [SEQ ID NO: 42]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
ggcaccatgctccttgggatgttgatgatctgtagtgct**ggt**gcgagagcg
p17
tcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccagggg
aaagaaaaaatataaattaaaacatatagtatgggcaagcagggagctagaacgattcg
cagttaatcctggcctgttagaaacatcagaaggctgtagacaaatactgggacagcta
caaccatcccttcagacaggatcagaagaacttagatcattatataatacagtagcaac
cctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagctttagacaaga
tagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacagga
cacagcagtcaggtcagccaaaattac
ttattcataatgatagtaggaggcttggtaggtttaagaatagtttttgctgtactttc
tgtagtgaatagagttaggcagggatattcaccattatcgtttcagacccacctcccaa
tcccgaggggat**aa**
gp41 transmembrane domain

FIGURE 51B

1. Amino acid sequence of p17 in natural form [SEQ ID NO: 43]:

M	G	A	R	A	S	V	L	S	G	G	E	L	D	R	W	E	K
I	R	L	R	P	G	G	K	K	K	Y	K	L	K	H	I	V	W
A	S	R	E	L	E	R	F	A	V	N	P	G	L	L	E	T	S
E	G	C	R	Q	I	L	G	Q	L	Q	P	S	L	Q	T	G	S
E	E	L	R	S	L	Y	N	T	V	A	T	L	Y	C	V	H	Q
R	I	E	I	K	D	T	K	E	A	L	D	K	I	E	E	E	Q
N	K	S	K	K	K	A	Q	Q	A	A	A	D	T	G	H	S	S
Q	V	S	Q	N	Y	*											

2. Amino acid sequence of p17 in secreted form [SEQ ID NO: 44]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	G	A	R	A	S	V
L	S	G	G	E	L	D	R	W	E	K	I	R	L	R	P	G	G
K	K	K	Y	K	L	K	H	I	V	W	A	S	R	E	L	E	R
F	A	V	N	P	G	L	L	E	T	S	E	G	C	R	Q	I	L
G	Q	L	Q	P	S	L	Q	T	G	S	E	E	L	R	S	L	Y
G	Q	L	Q	P	S	L	Q	T	G	S	E	E	L	R	S	L	Y
N	T	V	A	T	L	Y	C	V	H	Q	R	I	E	I	K	D	T
K	E	A	L	D	K	I	E	E	E	Q	N	K	S	K	K	K	A
Q	Q	A	A	A	D	T	G	H	S	S	Q	V	S	Q	N	Y	*

3. Amino acid sequence of p17 in membrane bound form [SEQ ID NO: 45]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	G	A	R	A	S	V
L	S	G	G	E	L	D	R	W	E	K	I	R	L	R	P	G	G
K	K	K	Y	K	L	K	H	I	V	W	A	S	R	E	L	E	R
G	Q	L	Q	P	S	L	Q	T	G	S	E	E	L	R	S	L	Y
N	T	V	A	T	L	Y	C	V	H	Q	R	I	E	I	K	D	T
K	E	A	L	D	K	I	E	E	E	Q	N	K	S	K	K	K	A
Q	Q	A	A	A	D	T	G	H	S	S	Q	V	S	Q	N	Y	L
F	I	M	I	V	G	G	L	V	G	L	R	I	V	F	A	V	L
S	V	V	N	R	V	R	Q	G	Y	S	P	L	S	F	Q	T	H
L	P	I	P	R	G	*											

FIGURE 52B

1. Amino acid sequence of p24 in natural form [SEQ ID NO: 49]:

```
M  P  I  V  Q  N  I  Q  G  Q  M  V  H  Q  A  I  S  P
R  T  L  N  A  W  V  K  V  V  E  E  K  A  F  S  P  E
V  I  P  M  F  S  A  L  S  E  G  A  T  P  Q  D  L  N
T  M  L  N  T  V  G  G  H  Q  A  A  M  Q  M  L  K  E
T  I  N  E  E  A  A  E  W  D  R  V  H  P  V  H  A  G
P  I  A  P  G  Q  M  R  E  P  R  G  S  D  I  A  G  T
T  S  T  L  Q  E  Q  I  G  W  M  T  N  N  P  P  I  P
V  G  E  I  Y  K  R  W  I  I  L  G  L  N  K  I  V  R
M  Y  S  P  T  S  I  L  D  I  R  Q  G  P  K  E  P  F
R  D  Y  V  D  R  F  Y  K  T  L  R  A  E  Q  A  S  Q
E  V  K  N  W  M  T  E  T  L  L  V  Q  N  A  N  P  D
C  K  T  I  L  K  A  L  G  P  A  A  T  L  E  E  M  M
T  A  C  Q  G  V  G  G  P  G  H  K  A  R  V  L  *
```

2. Amino acid sequence of p24 in secreted form [SEQ ID NO: 50]:

```
M  R  V  K  E  K  Y  Q  H  L  W  R  W  G  W  R  W  G
T  M  L  L  G  M  L  M  I  C  S  A  P  I  V  Q  N  I
Q  G  Q  M  V  H  Q  A  I  S  P  R  T  L  N  A  W  V
K  V  V  E  E  K  A  F  S  P  E  V  I  P  M  F  S  A
L  S  E  G  A  T  P  Q  D  L  N  T  M  L  N  T  V  G
G  H  Q  A  A  M  Q  M  L  K  E  T  I  N  E  E  A  A
E  W  D  R  V  H  P  V  H  A  G  P  I  A  P  G  Q  M
R  E  P  R  G  S  D  I  A  G  T  T  S  T  L  Q  E  Q
I  G  W  M  T  N  N  P  P  I  P  V  G  E  I  Y  K  R
W  I  I  L  G  L  N  P  I  V  R  M  Y  S  P  T  S  I
L  D  I  R  Q  G  P  K  E  P  F  R  D  Y  V  D  R  F
Y  K  T  L  R  A  E  Q  A  S  Q  E  V  K  N  W  M  T
E  T  L  L  V  Q  N  A  N  P  D  C  K  T  I  L  K  A
L  G  P  A  A  T  L  E  E  M  M  T  A  C  Q  G  V  G
G  P  G  H  K  A  R  V  L  *
```

3. Amino acid sequence of p24 in secreted form [SEQ ID NO: 51]:

```
M  R  V  K  E  K  Y  Q  H  L  W  R  W  G  W  R  W  G
T  M  L  L  G  M  L  M  I  C  S  A  P  I  V  Q  N  I
Q  G  Q  M  V  H  Q  A  I  S  P  R  T  L  N  A  W  V
K  V  V  E  E  K  A  F  S  P  E  V  I  P  M  F  S  A
L  S  E  G  A  T  P  Q  D  L  N  T  M  L  N  T  V  G
G  H  Q  A  A  M  Q  M  L  K  E  T  I  N  E  E  A  A
R  E  P  R  G  S  D  I  A  G  T  T  S  T  L  Q  E  Q
I  G  W  M  T  N  N  P  P  I  P  V  G  E  I  Y  K  R
W  I  I  L  G  L  N  K  I  V  R  M  Y  S  P  T  S  I
L  D  I  R  Q  G  P  K  E  P  F  R  D  Y  V  D  R  F
Y  K  T  L  R  A  E  Q  A  S  Q  E  V  K  N  W  M  T
E  T  L  L  V  Q  N  A  N  P  D  C  K  T  I  L  K  A
L  G  P  A  A  T  L  E  E  M  M  T  A  M  Q  G  V  G
G  P  G  H  K  A  R  V  L  L  F  I  M  V  I  Q  G  L
V  G  L  R  I  V  F  A  V  L  S  V  V  N  V  R  V  Q
G  Y  S  P  L  S  F  Q  T  H  L  P  I  P  R  G  *
```

FIGURE 53A

DNA sequence of modified Env including multi-clade V3 loops and Tat [SEQ ID NO: 52]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacatagcagaataggcgt
tactcgacagaggagagcaagaa**atg**gagccagtagatcctagactagagccc

Tat1

Tggaagcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgctt
tcattgccaagtttgtttcataacaaaagccttaggcatctcctatggcaggaagaagcggagac
agcgacgaagacctcctcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagta
catgtaatgcaacctatacaaatagcaatagtagcattagtagtagcaataataatagcaatagt
tgtgtggtccatagtaatcatagaatataggaaaatattaagacaaagaaaaatagacaggttaa
ttgatagactaatagaaagagcagaagacagtggca**atg**agagtgaaggagaaatatcagcactt
gtggagatgggggtggagatggg

Envelope

Gcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaattgtgggtcacagtctat
tatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgctaaagcata
tgatacagaggtacataatgtttgggccacacatgcctgtgtacccacagaccccaacccacaag
aagtagtattggtaaatgtgacagaaaattttaacatgtggaaaaatgacatggtagaacagatg
catgaggatataatcagtttatgggatcaaagcctaaagccatgtgtaaaattaaccccactctg
tgtt**ggagctggt**agttgtaacacctca

Delete V1V2, insert Gly,Ala,Gly

gtcattacacaggcctgtccaaaggtatcctttgagccaattcccatacattattgtgccccggc
tggttttgcgattctaaaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtca
gcacagtacaatgtacacatggaattaggccagtagtatcaactcaactgctgttaaatggcagt
ctggcagaagaagaggtagtaattagatctgccaatttcacagacaatgctaaaaccataatagt
acagctgaaccaatctgtagaaattaat**tgt**acaag

First multi-clade repeat

Acccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaa
taggaaaaataggaaatatgagacaagcacattgtctcgggtgtaccagacctaacaacaataca
agaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataataggggatat
aagacaagcacattgttgtacgagacccaacaataatacaagaaaaagtataaggataggaccag
gacaagcattctatgcaacaggagaaataataggagatataagacaagcacattgttgcacaagg
ccctacaacaatataagacaaaggacccccataggactagggcaagcactctatacaacaagaag
aatagaagatataagaagagcacattgttgtaccagaccctccaccaatacaagaacaagtatac
gtataggaccaggacaagtattctatagaacaggagacataacaggagatataagaaaagcatat
tgtggatcctgtacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacgagt
attttatacagcaggagaaataataggagacatcagaaaggcacattgttgtaccagacctaata
acaatacaagaaaaagtataacttttgcaccaggacaagcgctctatgcaacaggtgaaataata
ggagatataagacaagcacattgt**ctcggg**tgtaccagacctaacaacaata

Second multi-clade repeat

Caagaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataataggggat
ataagacaagcacattgttgtacgagacccaacaataatacaagaaaaagtataaggataggacc
aggacaagcattctatgcaacaggagaaataataggagatataagacaagcacattgttgcacaa
ggccctacaacaatataagacaaaggacccccataggactagggcaagcactctatacaacaaga
agaatagaagatataagaagagcacattgttgtaccagaccctccaccaatacaagaacaagtat
acgtataggaccaggacaagtattctatagaacaggagacataacaggagatataagaaaagcat
attgtggatcctgtacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacga
gtattttatacagcaggagaaataataggagacatcagaaaggcacattgttgtaccagacctaa
taacaatacaagaaaaagtataacttttgcaccaggacaagcgctctatgcaacaggtgaaataa

FIGURE 53A-continued

taggagatataagacaagcacattgtctcgggaacattagtagagcaaaatggaataacacttt

AvaI site, end of two multi-clade repeat

Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatctttaagcagt
cctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgt
aattcaacacaactgtttaatagtacttggtttaatagtacttggagtactaaagggtcaaataa
cactgaaggaagtgacacaatcaccctcccatgcagaataaaacaaattataaacatgtggcagg
aagtaggaaaagcaatgtatgcccctcccatcagtggacaaattagatgttcatcaaatattaca
gggctgctattaacaagagatggtggtaatagcaacaatgagtccgagatcttcagacctggagg
aggagatatgagggacaattggagaagtgaattatataaatataaagtagtaaaaattgaaccat
taggagtagcacccaccaaggcaaagagaagagtggtgcagactagtgcagtgggaataggagct
ttgttccttgg

Delete the cleavage site, insert SpeI site

gttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagac
aattattgtctggtatagtgcagcagcagaacaatttgctgagggctattgaggcgcaacagcat
ctgttgcaactcacagtctggggcatcaagcagctccaggcaagaatcctggctgtggaaagata
cctaaaggatcaacagctcctggggatttggggttgctctggaaaactcatttgcaccactgctg
tgccttggaatgctagttggagtaataaatctctggaacagatttggaataacatgacctggatg
gagtgggacagagaaattaacaattacacaagcttaatacactccttaattgaagaatcgcaaaa
ccagcaagaaaagaatgaacaagaattattggaattagataaatgggcaagtttgtggaattggt
ttaacataacaaattggctgtggtatataaaattattcataatgatagtaggaggcttggtaggt
ttaagaatagtttttgctgtactttctgtagtgaatagagttaggcagggatattcaccattatc
gtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggtg
gagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctggtaa

gp41, delete the 300 bp at C-terminal

FIGURE 53B

Amino acid sequence of modified Env including multi-clade V3 loops and Tat [SEQ ID NO: 53]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	T	E	K	L	W	V
T	V	Y	Y	G	V	P	V	W	K	E	A	T	T	T	L	F	C
A	S	D	A	K	A	Y	D	T	E	V	H	N	V	W	A	T	H
A	C	V	P	T	D	P	N	P	Q	E	V	V	L	V	N	V	T
E	N	F	N	M	W	K	N	D	M	V	E	Q	M	H	E	D	I
I	S	L	W	D	Q	S	L	K	P	C	V	K	L	T	P	L	C
V	G	A	G	S	C	N	T	S	V	I	T	Q	A	C	P	K	V
S	F	E	P	I	P	I	H	Y	C	A	P	A	G	F	A	I	L
K	C	N	N	K	T	F	N	G	T	G	P	C	T	N	V	S	T
V	Q	C	T	H	G	I	R	P	V	V	S	T	Q	L	L	L	N
G	S	L	A	E	E	E	V	V	I	R	S	A	N	F	T	D	N
A	K	T	I	I	V	Q	L	N	Q	S	V	E	I	N	C	T	R
P	N	N	N	T	R	K	S	I	R	I	Q	R	G	P	G	R	A
F	V	T	I	G	K	I	G	N	M	R	Q	A	H	C	L	G	C
T	R	P	N	N	N	T	R	K	S	V	R	I	G	P	G	Q	T
F	Y	A	T	G	D	I	I	G	D	I	R	Q	A	H	C	C	T
R	P	N	N	N	T	R	K	S	I	R	I	G	P	G	Q	A	F
Y	A	T	G	E	I	I	G	D	I	R	Q	A	H	C	C	T	R
P	Y	N	N	I	R	Q	R	T	P	I	G	L	G	Q	A	L	Y
T	T	R	R	I	E	D	I	R	R	A	H	C	C	T	R	P	S
T	N	T	R	T	S	I	R	I	G	P	G	Q	V	F	Y	R	T
G	D	I	T	G	D	I	R	K	A	Y	C	G	S	C	T	R	P
N	N	N	T	R	K	R	I	S	L	G	P	G	R	V	F	Y	T
A	G	E	I	I	G	D	I	R	K	A	H	C	C	T	R	P	N
N	N	T	R	K	S	I	T	F	A	P	G	Q	A	L	Y	A	T
G	E	I	I	G	D	I	R	Q	A	H	C	L	G	C	T	R	P
N	N	N	T	R	K	S	V	R	I	G	P	G	Q	T	F	Y	A
T	G	D	I	I	G	D	I	R	Q	A	H	C	C	T	R	P	N
N	N	T	R	K	S	I	R	I	G	P	G	Q	A	F	Y	A	T
G	E	I	I	G	D	I	R	Q	A	H	C	C	T	R	P	Y	N
N	I	R	Q	R	T	P	I	G	L	G	Q	A	L	Y	T	T	R
R	I	E	D	I	R	R	A	H	C	C	T	R	P	S	T	N	T
R	T	S	I	R	I	G	P	G	Q	V	F	Y	R	T	G	D	I
T	G	D	I	R	K	A	Y	C	G	S	C	T	R	P	N	N	N
T	R	K	R	I	S	L	G	P	G	R	V	F	Y	T	A	G	E
I	I	G	D	I	R	K	A	H	C	C	T	R	P	N	N	N	T
R	K	S	I	T	F	A	P	G	Q	A	L	Y	A	T	G	E	I
I	G	D	I	R	Q	A	H	C	L	G	N	I	S	R	A	K	W
N	N	T	L	K	Q	I	D	S	K	L	R	E	Q	F	G	N	N
K	T	I	I	F	K	Q	S	S	G	G	D	P	E	I	V	T	H
S	F	N	C	G	G	E	F	F	Y	C	N	S	T	Q	L	F	N
S	T	W	F	N	S	T	W	S	T	K	G	S	N	N	T	E	G
S	D	T	I	T	L	P	C	R	I	K	Q	I	I	N	M	W	Q
E	V	G	K	A	M	Y	A	P	P	I	S	G	Q	I	R	C	S
S	N	I	T	G	L	L	L	T	R	D	G	G	N	S	N	N	E
S	E	I	F	R	P	G	G	G	D	M	R	D	N	W	R	S	E
L	Y	K	Y	K	V	V	K	I	E	P	L	G	V	A	P	T	K
A	K	R	R	V	V	Q	T	S	A	V	G	I	G	A	L	F	L
G	F	L	G	A	A	G	S	T	M	G	A	A	S	M	T	L	T
V	Q	A	R	Q	L	L	S	G	I	V	Q	Q	Q	N	N	L	L
R	A	I	E	A	Q	Q	H	L	L	Q	L	T	V	W	G	I	K
Q	L	Q	A	R	I	L	A	V	E	R	Y	L	K	D	Q	Q	L
L	G	I	W	G	C	S	G	K	L	I	C	T	T	A	V	P	W
N	A	S	W	S	N	K	S	L	E	Q	I	W	N	N	M	T	W
M	E	W	D	R	E	I	N	N	Y	T	S	L	I	H	S	L	I
E	E	S	Q	N	Q	Q	E	K	N	E	Q	E	L	L	E	L	D
K	W	A	S	L	W	N	W	F	N	I	T	N	W	L	W	Y	I
K	L	F	I	M	I	V	G	G	L	V	G	L	R	I	V	F	A
T	H	L	P	I	P	R	G	P	D	R	P	E	G	I	E	E	E
G	G	E	R	D	R	D	R	S	I	R	L	V	N	G	S	L	A
L	I	W	*														

FIGURE 54A

DNA sequence of modified Env including multi-clade V3 loops, Tat and Rev [SEQ ID NO: 54]:

gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacatagcagaat
aggcgttactcgacagaggagagcaagaa**atg**gagccagtagatcctagactagagccc
Tat1
tggaagcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtg
ttgctttcattgccaagtttgtttcataacaaaagccttaggcatctcct**atg**gcagga
Rev1
agaagcggagacagcgacgaagacctcctcaaggcagtcagactcatcaagtttctcta
tcaaagcagtaagtagtacatgtaatgcaacctatacaaatagcaatagtagcattagt
agtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatataggaaaa
tattaagacaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagac
agtggca**atg**agagtgaaggagaaatatcagcacttgtggagatgggggtggagatggg
Envelope
Gcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaattgtgggtcaca
gtctattatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcaga
tgctaaagcatatgatacagaggtacataatgtttgggccacacatgcctgtgtaccca
cagaccccaacccacaagaagtagtattggtaaatgtgacagaaaattttaacatgtgg
aaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcct
aaagccatgtgtaaaattaaccccactctgtgtt**ggagctggt**agttgtaacacctca
Delete V1V2, insert Gly,ala,gly
gtcattacacaggcctgtccaaaggtatcctttgagccaattcccatacattattgtgc
cccggctggttttgcgattctaaaatgtaataataagacgttcaatggaacaggaccat
gtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaactcaa
ctgctgttaaatggcagtctggcagaagaagaggtagtaattagatctgccaatttcac
agacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaat**tgt**acaa
g
First multi-clades repeat
Acccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttg
ttacaataggaaaaataggaaatatgagacaagcacattgtctcgggtgtaccagacct
aacaacaatacaagaaaaagtgtacgtataggaccaggacaaacattctatgcaacagg
tgatataataggggatataagacaagcacattgttgtacgagacccaacaataatacaa
gaaaaagtataaggataggaccaggacaagcattctatgcaacaggagaaataatagga
gatataagacaagcacattgttgcacaaggccctacaacaatataagacaaaggacccc
cataggactagggcaagcactctatacaacaagaagaatagaagatataagaagagcac
attgttgtaccagaccctccaccaatacaagaacaagtatacgtataggaccaggacaa
gtattctatagaacaggagacataacaggagatataagaaaagcatattgtggatcctg
tacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacgagtatttt
atacagcaggagaaataataggagacatcagaaaggcacattgttgtaccagacctaat
aacaatacaagaaaaagtataacttttgcaccaggacaagcgctctatgcaacaggtga
aataataggagatataagacaagcacattgt**ctcggg**tgtaccagacctaacaacaata
Second multi-clade repeat
caagaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataata
ggggatataagacaagcacattgttgtacgagacccaacaataatacaagaaaaagtat

FIGURE 54A-continued

aaggataggaccaggacaagcattctatgcaacaggagaaataataggagatataagac
aagcacattgttgcacaaggccctacaacaatataagacaaaggacccccataggacta
gggcaagcactctatacaacaagaagaatagaagatataagaagagcacattgttgtac
cagaccctccaccaatacaagaacaagtatacgtataggaccaggacaagtattctata
gaacaggagacataacaggagatataagaaaagcatattgtggatcctgtacaagaccc
aacaacaatacaagaaaaagaatatctttaggaccaggacgagtattttatacagcagg
agaaataataggagacatcagaaaggcacattgttgtaccagacctaataacaatacaa
gaaaaagtataacttttgcaccaggacaagcgctctatgcaacaggtgaaataatagga
gatataagacaagcacattgtctcgggaacattagtagagcaaaatggaataacacttt
AvaI site, end of two multi-clade repeat
Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatcttta
agcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaa
ttttttctactgtaattcaacacaactgtttaatagtacttggtttaatagtacttggag
tactaaagggtcaaataacactgaaggaagtgacacaatcaccctcccatgcagaataa
aacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgcccctcccatcagt
ggacaaattagatgttcatcaaatattacagggctgctattaacaagagatggtggtaa
tagcaacaatgagtccgagatcttcagacctggaggaggagatatgagggacaattgga
gaagtgaattatataaatataaagtagtaaaaattgaaccattaggagtagcacccacc
aaggcaaagagaagagtggtgcagactagtgcagtgggaataggagctttgttccttgg
Delete the cleavage site, insert SpeI
gttcttgggagcagcaggaagcactatgggctgcacgtcaatgacgctgacggtacagg
ccagacaattattgtctgatatagtgcagcagcagaacaatttgctgagggctattgag
gcgcaacagcatctgttgcaactcacagtctggggcatcaaacagctccaggcaagaat
cctggctgtggaaagatacctaaaggatcaacagctcctggggatttggggttgctctg
gaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaatctctg
gaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacac
aagcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaag
aattattggaattagataaatgggcaagtttgtggaattggtttaacataacaaattgg
ctgtggtatataaaattattcataatgatagtaggaggcttggtaggtttaagaatagt
ttttgctgtactttctatagtgaatagagttaggcagggatattcaccattatcgtttc
agacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggt
ggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctg
ggacgatctgcggagcctgtgcctcttcagctaccaccgcttgagagacttactcttga
ttgtaacgaggattgtggaacttctgggacgcaggggtgggaagccctcaaatattgg
tggaatctcctacagtattggagtcaggaactaaagaatagtgctgttaacttgctcaa
tgccacagccatagcagtagctgagtaa

gp41, but 99 bp truncation at C-terminal

FIGURE 54B

Amino acid sequence of modified Env including multi-clade V3 loops, Tat and Rev [SEQ ID NO: 55]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	T	E	K	L	W	V
T	V	Y	Y	G	V	P	V	W	K	E	A	T	T	T	L	F	C
A	S	D	A	K	A	Y	D	T	E	V	H	N	V	W	A	T	H
A	C	V	P	T	D	P	N	P	Q	E	V	V	L	V	N	V	T
E	N	F	N	M	W	K	N	D	M	V	E	Q	M	H	E	D	I
I	S	L	W	D	Q	S	L	K	P	C	V	K	L	T	P	L	C
V	G	A	G	S	C	N	T	S	V	I	T	Q	A	C	P	K	V
S	F	E	P	I	P	I	H	Y	C	A	P	A	G	F	A	I	L
K	C	N	N	K	T	F	N	G	T	G	P	C	T	N	V	S	T
V	Q	C	T	H	G	I	R	P	V	V	S	T	Q	L	L	L	N
G	S	L	A	E	E	E	V	V	I	R	S	A	N	F	T	D	N
A	K	T	I	I	V	Q	L	N	Q	S	V	E	I	N	C	T	R
P	N	N	N	T	R	K	S	I	R	I	Q	R	G	P	G	R	A
F	V	T	I	G	K	I	G	N	M	R	Q	A	H	C	L	G	C
T	R	P	N	N	N	T	R	K	S	V	R	I	G	P	G	Q	T
F	Y	A	T	G	D	I	I	G	D	I	R	Q	A	H	C	C	T
R	P	N	N	N	T	R	K	S	I	R	I	G	P	G	Q	A	F
Y	A	T	G	E	I	I	G	D	I	R	Q	A	H	C	C	T	R
P	Y	N	N	I	R	Q	R	T	P	I	G	L	G	Q	A	L	Y
T	T	R	R	I	E	D	I	R	R	A	H	C	C	T	R	P	S
T	N	T	R	T	S	I	R	I	G	P	G	Q	V	F	Y	R	T
G	D	I	T	G	D	I	R	K	A	Y	C	G	S	C	T	R	P
N	N	N	T	R	K	R	I	S	L	G	P	G	R	V	F	Y	T
A	G	E	I	I	G	D	I	R	K	A	H	C	C	T	R	P	N
N	N	T	R	K	S	I	T	F	A	P	G	Q	A	L	Y	A	T
G	E	I	I	G	D	I	R	Q	A	H	C	L	G	C	T	R	P
N	N	N	T	R	K	S	V	R	I	G	P	G	Q	T	F	Y	A
T	G	D	I	I	G	D	I	R	Q	A	H	C	C	T	R	P	N
N	N	T	R	K	S	I	R	I	G	P	G	Q	A	F	Y	A	T
G	E	I	I	G	D	I	R	Q	A	H	C	C	T	R	P	Y	N
N	I	R	Q	R	T	P	I	G	L	G	Q	A	L	Y	T	T	R
R	I	E	D	I	R	R	A	H	C	C	T	R	P	S	T	N	T
R	T	S	I	R	I	G	P	G	Q	V	F	Y	R	T	G	D	I
T	G	D	I	R	K	A	Y	C	G	S	C	T	R	P	N	N	N
T	R	K	R	I	S	L	G	P	G	R	V	F	Y	T	A	G	E
I	I	G	D	I	R	K	A	H	C	C	T	R	P	N	N	N	T
R	K	S	I	T	F	A	P	G	Q	A	L	Y	A	T	G	E	I
I	G	D	I	R	Q	A	H	C	L	G	N	I	S	R	A	K	W
N	N	T	L	K	Q	I	D	S	K	L	R	E	Q	F	G	N	N
K	T	I	I	F	K	Q	S	S	G	G	D	P	E	I	V	T	H
S	F	N	C	G	G	E	F	F	Y	C	N	S	T	Q	L	F	N
S	T	W	F	N	S	T	W	S	T	K	G	S	N	N	T	E	G
S	D	T	I	T	L	P	C	R	I	K	Q	I	I	N	M	W	Q
E	V	G	K	A	M	Y	A	P	P	I	S	G	Q	I	R	C	S
S	N	I	T	G	L	L	L	T	R	D	G	G	N	S	N	N	E
S	E	I	F	R	P	G	G	G	D	M	R	D	N	W	R	S	E
L	Y	K	Y	K	V	V	K	I	E	P	L	G	V	A	P	T	K
A	K	R	R	V	V	Q	T	S	A	V	G	I	G	A	L	F	L
G	F	L	G	A	A	G	S	T	M	G	C	T	S	M	T	L	T
V	Q	A	R	Q	L	L	S	D	I	V	Q	Q	Q	N	N	L	L
R	A	I	E	A	Q	Q	H	L	L	Q	L	T	V	W	G	I	K
Q	L	Q	A	R	I	L	A	V	E	R	Y	L	K	D	Q	Q	L
L	G	I	W	G	C	S	G	K	L	I	C	T	T	A	V	P	W
N	A	S	W	S	N	K	S	L	E	Q	I	W	N	N	M	T	W
M	E	W	D	R	E	I	N	N	Y	T	S	L	I	H	S	L	I
E	E	S	Q	N	Q	Q	E	K	N	E	Q	E	L	L	E	L	D
K	W	A	S	L	W	N	W	F	N	I	T	N	W	L	W	Y	I
K	L	F	I	M	I	V	G	G	L	V	G	L	R	I	V	F	A
V	L	S	I	V	N	R	V	R	Q	G	Y	S	P	L	S	F	Q
T	H	L	P	I	P	R	G	P	D	R	P	E	G	I	E	E	E
G	G	E	R	D	R	D	R	S	I	R	L	V	N	G	S	L	A
L	I	W	D	D	L	R	S	L	C	L	F	S	Y	H	R	L	R
D	L	L	L	I	V	T	R	I	V	E	L	L	G	R	R	G	W
E	A	L	K	Y	W	W	N	L	L	Q	Y	W	S	Q	E	L	K
N	S	A	V	N	L	L	N	A	T	A	I	A	V	A	E	*	

FIGURE 55A

DNA sequence of HIV-1 (strain BH10) Protease (PI, nt 1407-1907) [SEQ ID NO: 56]:

atgttctttagggaagatctggccttcctacaagggaaggccagggaattttcttcagagcagaccagagcca
acagccccaccatttcttcagagcagaccagagccaacagccccaccagaagagagcttcaggtctggggt
agagacaacaactccccctcagaagcaggagccgatagacaaggaactgtatcctttaacttccctcagatc
actctttggcaacgacccctcgtcacaataaagataggggggcaactaaaggaagctctattagatacagga
gcagatgatacagtattagaagaaatgagtttgccaggaagatggaaaccaaaaatgatagggggaattgg
aggttttatcaaagtaagacagtatgatcagatactcatagaaatctgtggacataaagctataggtacagtatt
agtaggacctacacctgtcaacataattggaagaaatctgttgactcagattggttgcactttaaatttttaa

FIGURE 55B

Amino acid sequence of HIV-1 (strain BH10) Protease (PI) [SEQ ID NO: 57]:

M	F	F	R	E	D	L	A	F	L	Q	G	K	A	R	E	F	S
S	E	Q	T	R	A	N	S	P	T	I	S	S	E	Q	T	R	A
N	S	P	T	R	R	E	L	Q	V	W	G	R	D	N	N	S	P
S	E	A	G	A	D	R	Q	G	T	V	S	F	N	F	P	Q	I
T	L	W	Q	R	P	L	V	T	I	K	I	G	G	Q	L	K	E
A	L	L	D	T	G	A	D	D	T	V	L	E	E	M	S	L	P
G	R	W	K	P	K	M	I	G	G	I	G	G	F	I	K	V	R
Q	Y	D	Q	I	L	I	E	I	C	G	H	K	A	I	G	T	V
L	V	G	P	T	P	V	N	I	I	G	R	N	L	L	T	Q	I
G	C	T	L	N	F	*											

FIGURE 56A

DNA sequence of HIV-1 (strain BH10) Gag-PI [SEQ ID NO: 58]:

Atgggtgcgagagcgtcagtattaagcgggggagaattagatcgatgggaaaaaattcg
gttaaggccagggggaaagaaaaaatataaattaaaacatatagtatgggcaagcaggg
agctagaacgattcgcagttaatcctggcctgttagaaacatcagaaggctgtagacaa
atactgggacagctacaaccatcccttcagacaggatcagaagaacttagatcattata
taatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaagg
aagctttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagca
gcagctgacacaggacacagcagtcaggtcagccaaaattaccctatagtgcagaacat
ccaggggcaaatggtacatcaggccatatcacctagaactttaaatgcatgggtaaaag
tagtagaagagaaggctttcagcccagaagtaatacccatgttttcagcattatcagaa
ggagccaccccacaagatttaaacaccatgctaaacacagtggggggacatcaagcagc
catgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggatagagtacatc
cagtgcatgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgacata
gcaggaactactagtacccttcaggaacaataggatggatgacaaataatccacctat
cccagtaggagaaatttataaaagatggataatcctgggattaaataaaatagtaagaa
tgtatagccctaccagcattctggacataagacaaggaccaaaagaacctttagagac
tatgtagaccggttctataaaactctaagagccgagcaagcttcacaggaggtaaaaaa
ttggatgacagaaaccttgttggtccaaaatgcgaacccagattgtaagactattttaa
aagcattgggaccagcggctacactagaagaaatgatgacagcatgtcagggagtagga
ggacccggccataaggcaagagttttggctgaagcaatgagccaagtaacaaatacagc
taccataatgatgcagagaggcaattttaggaaccaaagaaagatggttaagtgtttca
attgtggcaaagaagggcacacagccagaaattgcagggcccctaggaaaaagggctgt
tggaaatgtggaaaggaaggacaccaaatgaaagattgtactgagagacaggctaattt
tttagggaagatctggccttcctacaagggaaggccagggaattttcttcagagcaga
ccagagccaacagccccaccatttcttcagagcagaccagagccaacagccccaccaga
agagagcttcaggtctggggtagagacaacaactccccctcagaagcaggagccgatag
acaaggaactgtatcctttaacttccctcagatcactctttggcaacgacccctcgtca
caataaagataggggggcaactaaaggaagctctattagatacaggagcagatgataca
gtattagaagaaatgagtttgccaggaagatggaaaccaaaaatgatagggggaattgg
aggttttatcaaagtaagacagtatgatcagatactcatagaaatctgtggacataaag
ctataggtacagtattagtaggacctacacctgtcaacataattggaagaaatctgttg
actcagattggttgcactttaattttaa

FIGURE 57

Primers for multi-clade V3 loops:

Clade A: (1). forward primer A888F5 [SEQ ID NO: 60]:
5'-aaa tca acc gga att gaa ttc **cct cgg g**tg tac cag acc taa caa caa tac-3'
EcoRI AvaI
(2). reverse primer A-CR3 [SEQ ID NO: 61]:
5'-att gtt ggg tct cgt aca aca atg tgc ttg tct tat atc ccc-3'

Clade C: (3). forward primer A-CF5 [SEQ ID NO: 62]:
5'-ggg gat ata aga caa gca cat tgt acg aga ccc aac aat ac-3'
(4). reverse primer C980R3 [SEQ ID NO: 63]:
5'-gtt gta ggg cct tgt gca aca atg tgc ttg tct tat atc –3'

Clade D: (5). forward primer D888F5 [SEQ ID NO: 64]:
5'-gat ata aga caa gca cat tgt tgc aca agg ccc tac aac-3'
(6). reverse primer D-ER3 [SEQ ID NO: 65]:
5'-ggt gga ggg tct ggt aca aca atg tgc tct tct tat –3'

Clade E: (7). forward primer D-EF5 [SEQ ID NO: 66]:
5' -ata aga aga gca cat tgt tgt acc aga ccc tcc acc-3'
(8). reverse primer E998R3 [SEQ ID NO: 67]:
5'-gta ttg ttg ttg ggt ctt gta caa caa tat gct ttt ctt ata tct cc-3'

Clade F: (9). forward primer F888F5 [SEQ ID NO: 68]:
5'-gga gat ata aga aaa gca tat tgt tgt aca aga ccc aac aac aat ac-3'
(10). reverse primer F-GR3 [SEQ ID NO: 69]:
5'-gtt att agg tct ggt aca aca atg tgc ctt tct gat gtc-3'

Clade G: (11). forward primer F-GF5 [SEQ ID NO: 70]:
5'-gac atc aga aag gca cat tgt tgt acc aga cct aat aac-3'
(12). reverse primer G989R3 [SEQ ID NO: 71]:
5'-aat aaa cta gtc tag acc **ccc gag** tct aga aca atg tgc ttg tct tat atc tcc-3'
AvaI XbaI